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The Effects of Education on Cardiovascular Disease Knowledge

Lauren A. Ostrowski-Winkler
Valparaiso University

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THE EFFECTS OF EDUCATION ON CARDIOVASCULAR DISEASE KNOWLEDGE

by

LAUREN A. OSTROWSKI- WINKLER

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DEDICATION

This project is dedicated to my best friend and husband, Chris. Without his steadfast support, patience, and encouragement along the way, I would have never made it this far. And to my parents, who have fostered my passion for learning since I was a young child. Their unwavering belief in me has helped me to achieve more than I ever imagined.

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ABSTRACT

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality for adults in the United States. The three main risk factors for the development of CVD include hypertension, high cholesterol, and tobacco use; these factors are largely prevented or reduced through lifestyle modifications. Researchers indicate that knowledge of CVD mortality has been linked with individual action to reduce one's CVD risk. Researchers have also indicated that segments of our underserved society, particularly those with the highest CVD mortality rates, are also the least knowledgeable about CVD and their own personal risk. These risk factors were a concern within the targeted population for this EBP project: adult patients at a rural Midwest outpatient health center. Using the Stetler Model and Kotter's Eight Stages of Change as guides, this EBP project was implemented with the objective of evaluating the effectiveness of video plus written education materials on CVD knowledge levels among adults with one or more risk factors for the development of CVD. Over an 8-week period, a total of 100 adult patients were asked to watch a 3-minute NHLBI video and provided a CDC written handout on CVD risk factors before their regularly scheduled appointments. Pre- and post-test knowledge tests were collected on 57 adults who completed the entire project. A paired sample *t*-test demonstrated that the educational intervention significantly increased patient's CVD knowledge ($p < .001$). Sixty-eight percent of patients reported they would change their lifestyle habits to reduce their CVD risk factors as a result of this education. The findings suggest this educational strategy resulted in overall favorable effects on patients with CVD risk factors.

CHAPTER 1

INTRODUCTION

Cardiovascular disease (CVD) is a disease of the heart and blood vessels often caused by atherosclerosis, or the buildup of plaques within the arterial walls. Atherosclerotic buildup over time limits blood flow through the arteries, creating narrowing and increasing the potential for a piece of the atherosclerotic plaque to break off and cause a heart attack or stroke (American Heart Association [AHA], 2011). CVD is the leading cause of morbidity and mortality for both men and women in the United States (Go et al., 2013). With one in every four deaths being tied to CVD, this largely preventable disease claims the lives of 600,000 American adults each year (Kochanek, Xu, Murphy, Minino, & Kung, 2011; Pearson et al., 2003). CVD also takes a significant toll on the U.S. financial system, costing over $312.6 billion dollars annually in health care services, medication, and lost productivity (Go et al., 2013). Future projections indicate that if CVD prevalence continues along the current rate of growth, 40.5% of Americans will have some form of CVD by 2030, with direct medical costs exceeding the $800 billion threshold (Heindreich et al., 2011).

Approximately half of all American adults have at least one of three main risk factors for developing CVD: hypertension (HTN), high LDL cholesterol, and tobacco use. Other risk factors for the development of CVD include diabetes, obesity, physical inactivity, poor diet, and excessive alcohol consumption (Centers for Disease Control and Prevention [CDC], 2013). Specifically, obesity, a sedentary lifestyle, high fat consumption, and smoking are all linked as independent, modifiable risk factors for the development of atherosclerosis. It is well known and empirically supported that one's risk for CVD can be decreased through adherance to dietary and lifestyle modifications: eating a healthy diet with low fat and salt, exercising regularly, stopping or refraining from smoking, and maintaining a healthy body weight (Lynch, Liu, Kiefe, & Greenland, 2006; Stampfer, Hu, Manson, Rimm, & Willett, 2000).

In order to effect lifestyle changes to reduce the prevalence of risk factors for CVD, individuals must have knowledge regarding CVD and the risk factors for developing this disease. Researchers indicate that awareness that CVD is the leading cause of death has been correlated with individual action to reduce one's risk factors for CVD (Mosca et al., 2006). Attempts to improve public knowledge and awareness of CVD have been made through national education programs, such as *Go Red for Women* from the American Heart Association, the U.S. Department of Health and Human Services's *Million Hearts* campaign, and *The Heart Truth* by the National Heart, Lung, and Blood Institute (CDC, 2013).

These national education programs have resulted in increases in knowledge and awareness regarding CVD and its risk factors. In a 2012 American Heart Association national survey, 56% of surveyed women were aware that CVD was the leading cause of death in both females and males, nearly double the portion of women with this knowledge just 5 years earlier (Mosca, Hammond, Mochari-Greenberger, Towfighi, & Albert, 2013). Despite what seems to be a substantial improvement in awareness, this same survey indicated that significant racial and ethnic minority disparities in awareness persist and a continued effort is needed to target these at-risk populations (Mosca et al., 2013).

Higher rates of morbidity and mortality are consistently linked with lower socioeconomic status (Homko et al., 2008). Socioeconomic status (SES), not race or ethnicity, has been reported as being the main driver of cardiovascular disease risk disparities (Karlamangla, Merkin, Crimmins, & Seeman, 2010). Researchers have also indicated that segments of our underserved society, particularly those with the highest CVD mortality rates are also the least knowledgeable about CVD and their own personal risk (Homko et al., 2008).

Statement of the Problem

Literature Support for the Project

Knowledge that CVD is a significant health problem within the American population is not new information. CVD has been the leading cause of death in the United States for more

than 100 years (Pearson et al., 2013). Decades of research and evidence have pointed to the fact that CVD is a largely preventable disease, demanding community-wide attempts to stimulate the changes needed within the population at large. Knowledge of a health problem and the negative consequences of a specific behavior have been shown to be the first step in making a corrective lifestyle change (Homko, et al., 2008; Kling et al., 2013; Lynch et al., 2006). Increasing knowledge of CVD risk factors may therefore decrease the rate of risk factor development (Lynch et al., 2006).

In a 2003 American Heart Association (AHA) community level guide to improving cardiovascular health, the AHA called for the need to educate communities at the individual level regarding CVD, its burden, risk factors, and steps to prevent this disease (Pearson et al., 2003). Despite this call to action, growth in disparities of risk for CVD across socioeconomic groups have persisted and widened (Go et al., 2013; Homko et al., 2008; Pearson et al., 2013). In an updated 2013 AHA community guide to improving cardiovascular health, interventions targeted specifically at the socioeconomically disadvantaged population were highlighted as critically important (Pearson et al., 2013). The 2013 AHA community guide indicated that educational interventions at the community-wide scale (e.g., mass-media campaigns) are important, but may not be successful at targeting the underserved groups of racial/ethnic minorities, children, or the elderly (Pearson et al., 2013). In order to target these groups, the AHA has specifically called for interventions within healthcare settings or worksites to improve recognition of CVD and its risk factors. Specifically, the AHA has called for, “research-based, effective educational materials and programs about changing and maintaining risk factors/risk behaviors, ways to prevent CVD and stroke, and early warning signs”, including the use of print and other media materials (Pearson et al., 2013, p. 1737).

Clinical Agency Project Support

The site of the EBP project implementation is one of seven of the organizations’ regional health locations. The EBP project implementation health center is located in a town where 8.5-

21.7% of residents live in poverty and 20% of adults are without any form of health insurance (Stats Indiana, 2013). These seven health centers are classified as Federally Qualified Health Centers (FQHC): health centers located in underserved areas designed to provide health care services to uninsured and underinsured residents at sliding-scale, income-based rates (U.S. Department of Health and Human Services, 2013a). Because these health centers are FQHCs, Medicare and Medicaid recipients as well as uninsured individuals are able to seek urgent and routine healthcare including medical and dental care through these health centers.

One nurse practitoner and four medical doctors were on staff at the the EBP project implementation health center providing medical healthcare services to an average of 100 patients per day, with approximately 16% of patients being hypertensive, 7% having diabetes, and 17.5% being obese (EBP Project Facility Nurse Practitioner, personal communication, May 31, 2013). Thus, the volume and condition of patients seen and cared for on a daily basis at this clinic posed a substantial demand on the providers. The population served at this health center was almost exclusively Medicare recipients, Medicaid recipients, and uninsured individuals. While the patients seen at this health center were encouraged to make this center their healthcare home, patients often only visited when urgent care was needed, making the preventive health education typically reviewed and discussed at annual health maintenance exams difficult to deliver in this population (EBP Project Facility Nurse Practitioner, personal communication, May 29, 2013). There was a lack of written educational material readily available for health providers to share with patients at this clinic. It was stated that if proper health education materials were made available at this clinic, educating patients on necessary health promotion topics would become more consistently and effectively carried out by all providers (EBP Project Facility Nurse Practitioner, personal communication, May 29, 2013).

Purpose of the Evidence Based Practice Project

Evidence based practice, by design, is a process of taking a clinical problem and changing practice to effectively address this problem using the most up to date literature

combined with practitioner expertise and patient preferences (Melnyk & Fineout-Overholt, 2005). The purpose of this evidence based practice project was to design and implement an effective, time-efficient, and readily available educational strategy for the clients served at this particular health center. After discussing at length the needs of this health center with the providers, the problem statement was fitted into the PICOT format, which was used to effectively search the literature. The PICOT format is a structured format used to shape a clinical question into an answerable, searchable question with five components, including the patient population (P), issue of interest (I), comparison (C), outcome of interest (O), and time frame (T) (Melnyk & Fineout-Overholt, 2005). The following PICOT question was devised for this EBP project: In adult patients with one or more risk factors for CVD (P), does the addition of video plus written educational material on CVD epidemiology, pathophysiology, and risk factors (I) as compared to standard of practice of abbreviated verbal education (C), provide a mean score increase in patients' knowledge of CVD (O) seen within an 11-week time frame (T)?

Significance of the Evidence Based Practice Project

CVD poses a significant threat to the health and well being to a majority of adults. With a lifetime risk of one-in-two men and one-in-three women over the age of 40 developing CVD, the importance of addressing this problem has never been greater (Go et al., 2013). Consistent with national trends, within the State of Indiana, CVD is inversely tied with income and educational levels (Indiana State Department of Health, 2012), making the underserved population at the center a particularly high-risk population for developing CVD. Furthermore, low income and education level populations are statistically more likely to have higher rates of CVD risk and lower levels of knowledge with regards to CVD (Homko et al., 2008; Karlamangla et al., 2010). Yet, the risks for CVD can be modified through individual lifestyle behaviors, including eating a healthy diet, exercising regularly, quitting smoking, and maintaining a healthy body weight (Lynch et al., 2006; Stampfer et al., 2000). As knowledge has been deemed as the first step in changing one's behaviors, education on the epidemiology and pathophysiology of CVD,

including symptoms and risk factors, will provide individuals with an essential tool for initiating actions to reduce their CVD risk (Bergman, Reeve, Moser, Scholl, & Klein, 2011; Homko et al., 2008; Kling et al., 2013; Lynch et al., 2006).

It was intended that the implementation of this evidence-based educational strategy would bring about two very important changes. First, providing CVD education to patients through evidence-based strategies would improve patient knowledge of CVD, including modifiable risk factors for developing CVD. This increase in knowledge would have in turn resulted in changes to personal lifestyle behaviors aimed at reducing one's risk for CVD. A secondary goal of this EBP project was that positive results from this educational strategy would serve as an impetus for this EBP project implementation health center to implement similar educational programs within their other locations to effectively improve patient awareness and knowledge of other preventable health conditions.

It is a Healthy People 2020 goal to increase the number of adults who are aware of the signs and symptoms of heart attack and stroke (U.S. Department of Health and Human Services, 2013b). AHA 2013 health guidelines also call for improving individual knowledge of CVD, particularly amongst low SES populations, through the provision of targeted educational materials at healthcare settings (Pearson et al., 2013). The successful implementation of this proposed EBP project within this area health center has initiated the change process that will continue to make a profound impact towards achieving these Healthy People 2020 and AHA goals.

CHAPTER 2

THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

Evidence-Based Practice Model

A number of evidence-based practice (EBP) models could be used to guide the development of an evidence based practice project. Most models of EBP share common components resembling the core definition of EBP, including (a) identifying the clinical problem and creating a culture of inquiry, (b) searching for and collecting the best evidence, (c) critically appraising the evidence, (d) integrating the best evidence with clinical practice and expertise, and (e) evaluating the outcomes of the practice change. After a review of the multiple EBP model choices, the Stetler Model was selected for use to guide this EBP project for two main reasons: (a) the model's focus on critical thinking and use of research findings and (b) the model's orientation toward individual practitioner use (Stetler, 2001).

The Stetler Model was first developed in 1976 and termed the Stetler/Marram Model for research utilization (Ciliska et al., 2011). Since its conception, the Stetler Model has undergone three revisions. These revisions have changed the focus to that of critical thinking and the use of evidence and research findings by the individual practitioner.

The Stetler Model is comprised of a series of five steps used to assess and integrate research findings to effectively carry out evidence-based nursing practice (Ciliska et al., 2011). These five steps include (1) preparation, (2) validation, (3) comparative evaluation and decision making, (4) translation and application, and (5) evaluation.

The first step, preparation, involves identifying a needed change within the workplace and developing the purpose of this change. Within this stage, a review of the environment in which this change would occur should be conducted, including an evaluation of the internal and external factors affecting the proposed change. Initiating the search for relevant sources of research and supplemental evidence are also critical components of this first stage (Ciliska et

al., 2011; Stetler, 2001). As Stetler's first stage applies to this EBP project, the doctoral student first identified the need for this change in education strategy at the EBP implementation health center while completing clinical hours within the setting. Discussion of the problem with another key stakeholder clinician, as well as identification of the AHA 2013 health guidelines for improving CVD knowledge particularly amongst low SES groups (Pearson et al., 2013), confirmed the need for this practice change. Time was dedicated to evaluating the environmental factors at the designated health center that could influence this proposed practice change. Consolidation of the goal into a concise purpose statement and PICOT question format then guided the initial search for relevant evidence to guide this EBP project.

In step two of the Stetler Model, research findings are critiqued with a focus on their practice applicability (Stetler, 2001). Within this stage, research sources should be critiqued with a specific use in mind and non-credible findings should be eliminated along the way (Stetler, 2001). Applying this stage of the Stetler Model within this EBP project, the doctoral student completed a systematic search of the evidence as well as critically evaluated the resources for use within this study following the Melnyk and Fineout-Overholt (2005) rapid critical appraisal tools. The included resources were also ranked using the Melnyk and Fineout-Overholt (2005) rating system for the hierarchy of evidence.

Comparative evaluation and decision making are the cornerstones of the third step of the Stetler Model. In this stage, the practitioner must compare and evaluate the existing data, including the strength of the data, and consolidate the meaning of this assembled evidence (Ciliska et al., 2011). The decision must also be made as to whether or not the research findings are acceptable for use based upon (a) pragmatic fit, (b) potential for the evidence to meet the identified need, and (c) feasibility of the practice change (Stetler, 2001). For this EBP project, the doctoral student scrutinized the evidence to determine whether or not its use within the designated health center would meet the determined educational strategy need. The educational strategy supported within the evidence was also evaluated for overall feasibility

within this setting. Using the third step of Stetler's model, the doctoral student was able to determine that the evidence supported using the intended educational strategy and implementing this change within the designated clinical setting; furthermore, the project leader concluded that this proposed EBP change would pose low-risk and provide potentially high-net benefit for the patient population.

Phase four of the Stetler Model includes the translation and application of research findings. In this stage, the individual practitioner must identify the specific change to be made, plan the application of this change, and put the plan into action (Stetler, 2001). For this EBP project, the project leader outlined a detailed plan for intervention that delineated the steps for carrying out the specific EBP change. This EBP policy was implemented using Kotter's eight steps of change as a guide for this practice change.

The final step in the Stetler Model involves evaluation of the practice change project success in meeting the identified goals and the cost-benefit of the change (Ciliska et al., 2011; Stetler, 2001). Stetler (2001) stated that the evaluation phase must also include evaluation of formative and summative data. Formative data include information regarding whether the research evidence was actually used as intended, while summative data includes information regarding whether or not the proposed goal of the practice change was met (Stetler, 2001). For this EBP project, formative data evaluated (a) the intervention techniques and (b) subject information to ensure findings were used in the appropriate context. Summative data evaluating the changes in subject knowledge of CVD was collected and evaluated to determine (a) the effectiveness of the intervention and (b) whether targeted goal of increasing knowledge level scores was attained.

Theoretical Model

In addition to the Stetler model guiding the EBP practice process, Kotter's eight steps of change were be used to guide the proposed practice change. With over 15 years of research and evidence from interviews of over 100 organizations regarding failed change attempts, John

Kotter first proposed his eight steps of change in a 1994 *Harvard Business Review* article titled, "Leading Change: Why Transformation Efforts Fail" (Kotter, 1996). The success of this 1994 article and professional demand for more information lead to Kotter's (1996) published book *Leading Change* in which he provided a detailed process for leading successful organizational change through eight stages (Kotter, 1996). Heavily influenced upon the Lewin/Schein three stage model, Kotter (1996) expanded the stages of unfreezing, moving, and refreezing into eight distinct stages, providing a more fundamental roadmap for effective change. Kotter (1996) also emphasized that refreezing should not be the end stage of the process as the organization should remain receptive for regular changes to occur. Kotter (1996) stressed the importance of following the eight step process in a linear fashion. Unsuccessful completion of any of the stages or a failure to follow through with each stage sequentially causes a weak foundation for change to be made, resulting in an unsuccessful endeavor (Kotter, 1996).

Kotter's eight steps of change include (1) creating a sense of urgency, (2) building a team force, (3) shaping a vision and strategy, (4) sharing the vision buy-in, (5) removing barriers and empowering action, (6) celebrating short-term wins, (7) continuing the change process, and (8) maintaining the change. Kotter (1996) emphasized the importance for creating a sense of urgency for the identified change in order to gain the necessary cooperation of others. Generating this sense of urgency often requires removing sources of complacency, which are most often the biggest roadblocks to starting change (Kotter, 1996). Creating an effective coalition for change involves finding key stakeholders within the firm that exhibit qualities of expertise, credibility, position power, and leadership (Kotter, 1996). Shaping the vision and strategy for change, the third step in the process, involves the team force creating a sensible and appealing picture of the future of the workplace and the strategies necessary to achieve that vision (Kotter, 1996). Once this vision and strategy has been formed, sharing these ideas with others in the organization becomes key. "The shared sense of a desirable future can help motivate and coordinate the kinds of actions that create transformations" (Kotter, 1996, p. 85).

Particularly, using real-life examples of how the organizational change will affect outcomes for the better results in greater buy-in from other employees (Kotter, 1996). Next, any barriers inhibiting the enactment of the change strategy need to be removed. If left in place, barriers may lead to frustration and undermining of the change progress. This fifth step also includes providing individuals with the proper tools and training necessary to effectively implement the change strategy (Kotter, 1996). Step six of Kotter's change model includes celebrating short-term successes. Recognition and celebration of short-term goal attainment helps to build morale and motivation as well as build momentum to continue to the change process (Kotter, 1996). Reinvigorating and continuing the change process is key to successful implementation of step seven of Kotter's change model. Inspiration from step six celebrations should be used to channel energy into tackling the next big projects necessary for the change procedures. Effective leaders should be recognized and developed so they may continue their role in implementing change (Kotter, 1996). Lastly, once the change strategy has been effectively carried out, the newly changed culture must be supported to make the change a lasting endeavor (Kotter, 1996).

Kotter's eight steps of change has become one of the cornerstones of effectively introducing change into the organizational work setting (Burns, Bradley, & Weiner, 2012). The somewhat step-wise approach of both Kotter and Stetler's models made the integration of the two for this EBP project a seamless fit. The two models were together implemented and used as a checklist towards monitoring progress of the EBP project. Another major strength of using Kotter's change model included the emphasis on a team-approach to creating change. The development of a team of leaders to carry out this change within the health center helped teach others how EBP change can be performed into the future, long after this particular project was completed. A limitation to the use of Kotter's eight stages however, included the somewhat lengthy and laborious process of completing the eight stages.

Literature Search

The search for literature relevant to the identified problem began with the development of the refined PICOT statement. A review of the literature, using this PICOT statement, was conducted as part of the validation phase of the Stetler Model used to guide this EBP project.

Search engines and key words. Computer-based, electronic databases were searched followed by a hand search for the best available evidence related to improving knowledge through a combination of written and video educational approaches. A total of eight databases were searched: Joanna Briggs Institute Clinical Online Network of Evidence for Care and Therapeutics (JBI ConNect), Cochrane Collaboration and Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Education Resources Information Center (ERIC), MEDLINE via EBSCO, ProQuest, Psych INFO, and National Guideline Clearinghouse. The keywords heart disease, risk*, knowledge and effect* and education, separated by the Boolean operator AND were first used to conduct the search. However, the results of using these particular keywords retrieved articles concentrating on the rates of knowledge and awareness of heart disease. There was no focus on the methods of changing this knowledge level. Those articles that did look at changing knowledge levels addressed long-term individualized therapies and meetings to improve knowledge rates. These approaches were not relevant to the proposed change approach within this particular health care setting. Working with the research librarian for the college of nursing at the university library provided the necessary guidance to change the search strategy to appropriately fit the evidence support needs of this project.

For the final search, the keywords used to search the databases included “knowledge” separated with the Boolean operator AND; pamphlet*, brochure*, handout*, and written material* each separated by the Boolean operator OR; and video*, movie*, and visual* separated by the Boolean operator OR. These keywords were searched within abstracts, titles, and keywords of scholarly, peer-reviewed, English language journals, published within the last 10 years (2003-2013). Articles included within the search were limited to randomized-control

trials (RCTs), qualitative reviews, meta-analysis, systematic reviews, descriptive studies, clinical trials, practice guidelines, and EBP.

Inclusion and exclusion criteria. In order to systematically narrow the initial search returns from the searched databases, strict inclusion and exclusion criteria were used. Included articles were selected based upon meeting the following criteria: (a) peer reviewed, (b) research, (c) published in English language, (d) dated 2003 and later, (e) focused on adults, (f) outpatient healthcare setting, (g) multimedia education in video or web-based video format either in combination with or separate from written education. Publications excluded from the literature review included articles that (a) focused on children, (b) were performed in hospital in-patient settings, (c) focused on foreign, non-English speaking patient populations, (d) involved individual intensive education or group education sessions, (e) did not include knowledge as an outcome measure, or (f) were systematic review proposals.

A total of 258 articles were found using the search methods described previously. A review of all abstracts, or when not available the full-text article, was completed analyzing each according to the inclusion criteria. Once duplicate pieces of evidence were removed and inclusion criteria applied, a total of 19 articles were selected for full-text review. The exclusion criteria were applied to these articles, resulting in a total of 10 articles included for final review.

Levels of evidence. The Melnyk and Fineout-Overholt (2005) rating system for the hierarchy of evidence was used to rate the evidence included to support this EBP project. Using a rating system for levels of evidence allows for categorization of literature findings into groups based upon the strength of the evidence that is presented in the article. According to the Melnyk and Fineout-Overholt (2005) rating system, evidence is ranked in a 7-level hierarchy system. Systematic reviews and meta-analysis of randomized control trials are found at the top of the pyramid and constitute the strongest level of evidence, level I. Level II evidence consists of well-designed randomized control trials, and level III is comprised of non-randomized, well-designed control trials. Level IV evidence includes evidence from cohort studies and well-designed case-

control studies. Level V evidence consists of evidence from systematic reviews of both descriptive and qualitative studies. Qualitative studies and single-descriptive study evidence constitute level VI, while level VII consists of evidence from authority opinions as well as expert committee reports. Categorization of the evidence included according to the hierarchy level can be found in Appendix A.

Appraisal of Relevant Evidence

The Melnyk and Fineout-Overholt (2005) critical appraisal principles and rating system for hierarchy of evidence were used to appraise each piece of evidence. Using the Melnyk and Fineout-Overholt (2005) critical appraisal principles to appraise the sources of evidence consisted of evaluating each piece of evidence on three critical criteria: (a) the validity of the results, (b) the reliability of the evidence, and (c) how applicable the results were to the EBP practice change. Ten total pieces of evidence were included for the final review: one systematic review (Level I), four RCTs (Level II), three control trials without randomization (Level III), one descriptive study (Level VI), and one expert committee practice guideline recommendation (Level VII).

Level I Evidence

Ciciriello et al. (2013) performed a systematic review to evaluate the effects of multimedia patient education used to teach patients and caregivers of all ages about prescribed and over-the counter medications. Reviewers searched a total of seven electronic databases and sources for both RCTs and quasi-RCTs, following explicitly defined search terms and methods. A total of 4562 studies were initially identified, while a final count of only 24 were found to meet the inclusion criteria, including randomized or quasi-randomized control trials that (a) contained interactive or tailored multimedia educational interventions in video or audio formats or a combination of text plus video or text plus audio formats or (b) included education regarding a specific medication or group of medications. Eligibility for inclusion within this systematic review was not dependent on the study outcome. Titles and abstracts of potential

articles were independently reviewed by two reviewers who then, based upon specified inclusion and exclusion criteria, independently extracted data from the included studies according to the Cochrane Consumers and Communication Review Group template. Discrepancies between the two reviewers were resolved through discussion or by consultation of a third author. The outcomes gathered and reported from included studies were grouped into primary and secondary categories. Primary outcomes included patient or caregiver knowledge and measures of skill acquisition. Secondary outcomes included health related behaviors, health outcomes, and patient or caretaker-reported outcomes. Six of the 10 studies measuring knowledge provided enough data for meta-analysis. Patient knowledge measured within four weeks of intervention was greater in the multimedia education group as compared to usual education or no education, *SMD* = 1.04, 95% CI [0.49, 1.58]. Three studies comparing multimedia education to other forms of education also measured knowledge as an outcome, but the results were unable to be pooled for meta-analysis due to incomplete reporting of knowledge scores. Ciciriello et al. (2013) concluded that there was moderate quality evidence from two studies and a total of 381 participants to support multimedia educational interventions as more effective for increasing knowledge when combined with another intervention (e.g., written information or brief instructions from health care providers) as compared to written or brief instructions alone, *MD* = 24.55%, 95% CI [22.34, 26.83%]. Multimedia education was also found to be more effective than usual care or no education in improving skill acquisition, specifically with regard to inhaler technique, *MD* = 18.32%, 95% CI [11.92, 24.73%]. The findings of this review provide good support for the proposed practice change. While there was no overall meta-analysis of data, the results reported do support the effectiveness of multimedia educational approaches to improving knowledge levels.

Level II Evidence

Armstrong, Idriss, and Kim (2011) conducted a 12-week RCT at the University of California, Davis medical center to asses the efficacy of an online video as a format of education

versus a written educational pamphlet. Individuals who had a known allergy to sunscreen or had a diagnosis of psoriasis were excluded from the study population. Ninety-four English speaking adults over the age of 18 were assigned, using a simple, non-stratified randomization scheme, into one of two groups: (a) the intervention group viewing an online video on sunscreen (n = 47), or (b) the control group receiving a written educational pamphlet with the same information as the video on sunscreen (n = 47). A before-and-after assessment of sunscreen behaviors, based upon the standards from the National Health and Nutrition Examination Survey (NHANES), as well as knowledge regarding sunscreen use and ultraviolet light effects were measured.

Participants in the intervention arm of the Armstrong, Idriss, et al. (2011) study received specific instruction on (a) how and where to access the online video and (b) the importance of watching the video at least once during the duration of the 12-week study. The online video consisted of information regarding how sunscreen protects the skin, the importance of using sunscreen, different types of sunscreen, and the proper application of sunscreen. Participants in the control arm of the study were provided with a pamphlet containing the identical information found on the online video but in written format.

The primary outcomes evaluated by Armstrong, Idriss, et al. (2011) were sunscreen knowledge and sunscreen application behavior as measured using a knowledge questionnaire and self-reported sunscreen use behaviors. The video (intervention) group (6.9 +/- 1.3) and the pamphlet (control) group (6.5 +/- 1.4) had similar baseline knowledge scores at the outset of the study (p = 0.148). After 12 weeks of the intervention, both the intervention and control groups had a significant improvement in sunscreen knowledge, (8.8 +/- 1.4, 7.6 +/- 1.2, respectively, p < 0.001). Inter-group analysis revealed a significant improvement in knowledge within the video intervention group (2.0 +/- 1.5) as compared to the pamphlet control group (1.2 +/- 1.0), p = 0.003. Inter-group analysis also revealed greater improvement in sunscreen application behavior as measured in days per week, within the video intervention group as compared to the pamphlet control group (1.9 +/- 2.3 and 0.2 +/- 0.5, respectively, p < 0.001). Finally, the video

intervention group overall rated the appeal and usefulness of the video significantly higher than the pamphlet group did their written pamphlet materials. Although Armstrong, Idriss, et al. targeted the use of sun protection within a relatively small sample size and amongst highly-educated individuals, the researchers' overall significant findings in support for video-based education provide good support in favor of the proposed educational practice change.

Additional research conducted at University of California, Davis also provides support for the use of the video educational format. Armstrong, Kim, Idriss, Larsen, and Lio (2011) conducted an RCT within a dermatology clinic to determine the effectiveness of a video versus written pamphlet education in improving knowledge and clinical outcomes for adults with atopic dermatitis. The study population consisted of patients at an outpatient University of California, Davis dermatology clinic who were (a) 18 years or older, (b) diagnosed with atopic dermatitis according the Hanifin and Rajka criteria, (c) English speaking, and (d) able to view videos online. Randomization of patients into two groups, video (n = 40) or pamphlet (n = 40), was achieved using a nonstratified randomization scheme generated by randomization software. A comparison of demographic factors between the pamphlet and video groups did not reveal any significant differences in age, sex, marital status, education level, ethnicity, or employment status.

The educational video and pamphet interventions both contained identical information regarding clinical manifestations of atopic dermatitis, exacerbating factors, hygiene techniques, and common treatment options. Patients in the video group were provided with detailed instruction on how to access the online video and asked to provide return demonstration of retrieving this online video before being instructed to watch the video at least once during the 12-week study period. Patients in the pamphlet group were provided with a written pamphlet and were instructed to review the material at least once during the 12-week study period.

Armstrong, Kim, et al. (2011) evaluated knowledge and patient-oriented eczema measures (POEM) at baseline and again 12 weeks after the intervention. Knowledge was measured using

a study-specific, pre-tested 14-item questionnaire drawn from the content of the educational materials. The POEM questionnaire used as the primary outcome measure in the study has been established as a sensitive and valid disease severity measure of AD. The Student *t*-test was used to calculate between-group comparisons of POEM and AD knowledge scores. Paired *t*-tests were also used to analyze study group variables for pre- and post-study comparisons. Participants in the video group had a significantly reduced POEM score at the end of the study ($p < 0.001$), indicating a significant reduction in AD disease severity. Pamphlet group POEM scores were also reduced, though not significantly ($p = 0.92$). An intergroup analysis indicated a significantly greater reduction in POEM scores amongst the video group as compared to the pamphlet group ($p = 0.0043$). Both the video and pamphlet groups were found to have significant improvements in knowledge scores post-study ($p < 0.001$). However, the improvements in knowledge scores were greater amongst patients in the video group as compared to the pamphlet group ($p = 0.011$). Despite the relatively small population in this study as well as the high education level of the subjects, the relative success of the interventions and procedures used within this study provide good support for the proposed practice change.

In another RCT, this time using 200 university undergraduate students, Krawczyk et al. (2012) evaluated the efficacy of written and video educational interventions on increasing human papilloma virus (HPV) knowledge and intent to vaccinate. The study development was guided by the Health Belief Model (HBM); the HBM assumes that when disease susceptibility and severity of HPV are perceived as high and the pereived benefit of the vaccine is introduced, the cue to action (educational intervention) may trigger a behavior change. Students recruited for participation from a psychology course at a Montreal, Quebec, Canada university via advertisements were randomly assigned to one of three groups: (1) written education material ($n = 61$), (2) video education material ($n = 74$), and (3) control ($n = 65$). Randomization was achieved via computer assisted number assignment, completed by two research assistants. Participants in the written education arm of the study were provided with a pamphlet of

information regarding HPV and the HPV vaccine. Participants in the treatment arms of the study received materials identical in content, while participants in the control arm were provied with general information regarding cancer prevention strategies in pamphlet format. The written and video education materials for the treatment groups contained up-to-date, evidence-based information developed by the study authors and an additional HPV expert. Pre-intervention, each participant completed a knowledge questionnaire, demographics form, and a questionnaire focusing on their general health and sexual health history. Individuals in all three arms were given a total of five minutes to review their respective educational materials. Post-intervention knowledge was again evaluated using the same pre-intervention knowledge scale made for this particular study, which demonstrated a high internal consistency (Cronbach's alpha = 0.86). Analysis of variance (ANOVA) was used to evaluate the efficacy of the educational interventions to increase knowledge between and within group subjects. The researchers found a significant increase in knowledge in both the written and video education arms of the study (M = 6.98, M = 5.21, respectively, $p < 0.05$). However, the mean difference in knowledge gained between the written and video groups was not statistically significant. Both the video and written education arms of the study were also found to have significantly higher post-intervention intentions to vaccinate as compared to the control group. Given the selection of participants from a university class setting, the evidence from this study is limited in its generalizability to the proposed EBP practice change. However, the process used is consistent with the style proposed for this EBP project, making procedures supportive to the proposed EBP project plan.

Schnellinger et al. (2010) conducted an RCT within an urban Minneapolis pediatric emergency department evaluating the effect of a video versus pamphlet style educational method on improving parent knowledge regarding proper antibiotic use in children. The study population consisted of consenting, English speaking, adult parents or guardians seeking acute, non-urgent care for their child at the emergency department. A total of 246 adults were

randomized, using a random number-generated list assigned by order of recruitment, into one of three groups, pamphlet group (*n* = 79), video group (*n* = 83), or control group (*n* = 84).

Patients in the intervention arms of the Schnellinger et al. (2010) study received clearly defined interventions. The pamplet group received a written pamplet with the American Academy of Pediatrics (AAP) information regarding appropriate antibiotic prescription and use in children. Patients in this pamplet group were given up to 15 minutes to review the pamphlet information and were then required to return the pamphlet to the research assistant. Those patients in the video intervention group viewed a 3-minute animated video, one time only, containing the same AAP information on antibiotics. Patient knowledge concerning antibiotic use was measured using a study-specific designed 10-question survey administered, with the order of questions scrambled, at three time intervals: after enrollment but before the intervention, 90 minutes to two hours after the intervention, and four weeks after the intervention. Scores between the three groups at each of three knowledge assessment intervals were evaluated using the Kruskal Wallis test and the Mann-Whitney U test to compare results between the groups, two at a time. Knowledge scores were significantly improved in both the video and pamphlet groups at both follow-up assessment timings as compared to baseline scores ($p < 0.001$). Knowledge scores for the video intervention group were also somewhat better than the pamphlet group ($p = 0.04$) at the four-week folow-up assessment. Knowledge scores for the video group were also consistently greater than the control group scores across all three time intervals ($p < 0.001$) as compared to pamphlet group scores exceeding control group scores only immediately after the intervention. This study's designed intervention and positive effects of video based education provided good support for the proposed practice change.

Level III Evidence

Eckman et al. (2012) conducted a non-randomized control trial to determine the effectiveness of educational interventions and health literacy on knowledge and health

behaviors in patients with coronary artery disease. Recruited patients included low-income, Medicare and Medicaid adults from three ambulatory hospital-based internal medicine practices. Eligible patients were contacted by telephone two weeks prior to their appointment and if willing to participate, were asked to arrive 90 minutes before their scheduled appointment. A total of 540 patients were recruited, but only 170 completed the entire 6-month study. Each consenting patient, sequentially listed in the appointment schedule, was assigned to one of two groups: (a) video plus written education (n = 83), or (b) written education (n = 87). After providing demographics, education, and insurance information, patients completed the 12-item Physical Actvity Scale for the Elderly (PASE), the MEDIFACTS questionnaire regarding dietary adherance to the National Cholesterol Education Program diet, the CAD knowledge assessment, and the Rapid Estimate of Adult Literacy in Medicine (REALM). Patients were then given 40 minutes to either (a) watch the video and read the booklet or (b) just read the booklet. After this time, the normal scheduled appointment took place and then the post-intervention CAD knowledge assessment was completed. Patients were also followed up via telephone at three months and six months post-intervention and were surveyed using the PASE and MEDIFACTS questionnaire, followed by the CAD knowledge assessment at the respective time intervals. Post-intervention knowledge scores were shown to improve slightly more, though not significantly, in the video plus written education intervention group versus the written only education group (1.41 vs. 0.81, p = 0.07). CAD knowledge scores also showed significant improvement at the six-month follow-up as compared to baseline scores, for both intervention groups. For the video plus written education group, significant improvements in health behaviors including exercise, diet, and weight loss were found, as compared to non-significant improvements within the written education group. With regard to health literacy, there was no significant difference in CAD knowledge score improvement between patients with higher or lower health literacy. CAD knowledge scores were shown to improve significantly in both health literacy subgroups in baseline versus six-month follow-up scores. Interestingly, the video and

written intervention was correlated with greater weight loss among lower health literacy patients (p = 0.05). While not significantly different, the evidential support from both intervention arms of this study yields strong applicability for the proposed practice change. The health behavior outcomes identified in this study also add to the strength of the proposed practice change as beneficial potential effects for patients.

Frosch, Legare, and Mangione (2008) conducted a quasi-experimental study evaluating the effects of video versus written educational materials regarding cancer screening among ethnically and racially diverse, low-income patients at 13 urban California primary care clinics. The study population included English and Spanish speaking adults aged 50 or older who (a) did not have a history of prostate or colon cancer, and (b) who were eligible for prostate or colon cancer screenings based upon clinical guidlelines. Patients were split into one of two experimental groups on a sequential system; for every 10 patients recruited and consenting upon arriving at the particular office, these 10 patients were placed into the brochure education intervention group. The next 10 patients from this same office were then placed into the video education intervention group. Across the groups, no significant differences were noted for any demographic variables. The 107 brochure intervention patients and the 100 video intervention patients were given 30 minutes to either review a written brochure about prostate and colon cancers and screening options, or view a video reviewing a description of prostate and colon cancers, as well as screening options, outcomes, and real patient testimonials. Following the respective interventions but before completing their regularly scheduled primary care medical appointment, patients completed a written survey assessing their preferences in medical decision-making, attitides towards working together with their physician, perceived social norms, and self efficacy. Cronbach's alpha scores were available for attitudes, perceived social norms, and self efficacy evaluation questions (0.71, 0.88, and 0.85, respectively).

Frosch et al. (2008) analyzed collected data using Chi square and unadjusted ANOVA methods. Participants in the video education group were found to have a greater desire to be

the main decision maker in deciding whether or not cancer screenings are performed. Those patients viewing the video educational materials also had significantly greater knowledge scores than those receveing the written educational materials regarding prostate and colon cancers, $F(1,79.73) = 11.23$ and $F(1, 115.99) = 11.15$, respectively ($p = 0.001$). There were no significant differences found between groups on self-efficacy, perceived social norms, or attitudes. Interestingly, 57.1% of patients in the brochure group reported discussing cancer screenings with their doctor, compared to only 45.8% of patients in the video group ($p = 0.272$). This study's findings as well as practice sites and intervention design provide good support for the proposed practice change.

Wilson et al. (2010) used a quasi-experimental design to examine whether video or print-based educational materials on asthma improved asthma knowledge amongst patients seeking care at two inner-city based primary care health centers located in Chicago and Connecticut. A total of 292 adults, with an average high school level of education, over the age of 40 were recruited; more than half of the participants were of minority anscestry. Only 27% of participants had a diagnosis of asthma, while another 18% claimed to be using an inhaler, and another 20% cared for a family member with asthma. Patients were sequentially assigned upon appointment arrival to one of four experimental groups based upon the design of the educational materials recieved: (a) video only ($n = 76$), (b) print only ($n = 75$), (c) video and print ($n = 69$), or (d) control ($n = 72$). Both the video and print materials contained identical information regarding best practices for managing asthma symptoms, avoiding triggers, and how to properly use an inhaler. The procedure for this study was tightly controlled, including allowing only the same amount of time (7 minutes and 12 seconds, equal to the duration of the video) for each intervention group to review the educational materials assigned. After their respective educational intervention, patients completed assessments regarding functional knowledge of asthma, knowledge on inhaler use, a mini-mental status exam, and the REALM. One week after the intervention, patients were reached via telephone and asked the knowledge assessment

questions again and also queried on whether or not print materials received were viewed at all between the intervention and the follow-up telephone call. Data analysis comparing intervention groups to controls revealed a statistically significant increase in asthma knowledge amongst the video and print intervention groups, β = 25.2, 95% CI [22.5, 27.9] and β = 24.8, 95% CI [21.8, 27.9] ($p < 0.001$). Participants in the video and print and the print only groups also demonstrated greater knowledge improvement scores for asthma triggers at the one-week follow-up as compared to the video only group, β = 17.2, CI 95% [12.7, 21.7]; β = 15.6, CI 95% [11.3, 20.0]; and β = 10.1, 95% CI [5.8, 14.4], respectively ($p < 0.001$). Amongst individuals with limited literacy levels, short-term knowledge scores were improved for patients in the video as compared to those in the print material group, however this effect was removed at the one-week follow up assessment, β = 6.4, $p < 0.001$, 95% CI [3.2, 9.6] and β = 0.6, $p = 0.69$, 95% CI [-2.2, 3.4]. Of the 144 participants receiving some form of print material based upon their intervention group, over half of the individuals reported resourcing this material at some point between the intervention and the one-week follow-up. Consistent with other literature, the findings from this study support the practice of educating patients on health conditions using multi-modalities, particularly for patients with limited literacy and of minority populations. Given the target population for this EBP, this evidencial support is rated as strong.

Level VI Evidence

Thompson, Silliman, and Clifford (2013) conducted a pilot descriptive study to measure knowledge, perceived benefit, and perceived self-efficacy in managing side effects of chemptherapy and nutrition following a DVD and pamphlet educational intervention. Fourteen adult chemotherapy patients from a rural California outpatient cancer center were selected for inclusion. Patients were shown a 15-minute DVD regarding dietary management of chemotherapy side effects while receiving their treatment and then provided with a handout covering the same content, before leaving their appointment. Knowledge, perceived benefit, and self-efficacy were measured using the same survey before the intervention and again two

weeks after the intervention, this time by telephone. The survey used was created specifically for this study and consisted of 16 total items, with the four knowledge questions measured as a Cronbach's alpha of 0.86. Paired *t*-tests were used to measure the changes in knowledge scores between pre- and post-intervention assessments. Knowledge scores were found to have increased significantly after the intervention at the two-week follow up for each of the four knowledge assessment questions (1.4 +/- 1.3 vs. 2.7 +/- 1.3, $p = 0.001$; 1.2+/-1.1 vs. 2.1 +/- 0.5, $p = 0.03$; 2.2 +/- 1.5 vs. 3.5 +/- 0.7, $p = 0.01$; and 1.5 +/- 1.5 vs. 3.4 +/- 0.5, $p = 0.001$, respectively). Perceived self-efficacy also significantly improved after the intervention ($p = 0.004$). This study's small sample size limits the strength of the findings, but the improved knowledge scores does support the proposed practice change within this EBP project.

Level VII Evidence

Friedman, Cosby, Boyko, Hatton-Bauer, and Turnbull (2011) conducted a systematic review of the evidence regarding the outcomes of various teaching methods and strategies for patient education in the healthcare setting for the purposes of presenting a practice guideline recommendation. Four databases (MEDLINE, EMBASE, CINAHL, and HealthSTAR) were searched for data pertaining to patient education, including teaching strategies and delivery methods within the 1995 to May 2009 timeframe. A detailed report of the search terms and strategies used within each database was also detailed in the appendix section. A total of 23 systematic reviews and meta-analysis published in English, focusing on patient education strategies and methods of delivery, and with teaching interventions versus standards of care or teaching interventions versus another teaching intervention, were included for review. Due to the abundance of the highest-level evidence reports, the individual trials' reports were excluded from this analysis. Each systematic review included was critiqued using the AMSTAR tool. The outcomes reported by each systematic review and meta-analysis were grouped into three categories: (a) patient knowledge, (b) anxiety, and (c) satisfaction. Teaching strategies reviewed were categorized according to the Patient Education Task Force of the United Health Network,

including (a) traditional lecture, (b) discussions, (c) simulated games, (d) computer technology, (e) written material, (f) audiovisual sources, (g) verbal recall, (h) demonstration, and (i) role playing. Because of the variety of reporting measures used in the reviews and analysis as well as the differences in tools used within each individual study, the effect sizes were unable to be calculated for each category. Rather, evidence for each was summarized and ranked based upon the strength of the individual reviews. The practice guideline recommendation and systematic review were thoroughly reviewed by blinded staff members of the Cancer Care Ontario Program in Evidence-Based Care (PEBC), as well as two individual experts from the PEBC Report Approval Panel.

Of the 23 systematic reviews and meta-analysis reviewed, seven focused upon the use of videotapes as a patient education method. The use of videotape education methods was consistently found to improve knowledge levels as compared to controls, and in one study, increased knowledge levels up to four weeks following the intervention, as compared to control.

Six systematic reviews or meta-analysis reviewed the effect of written materials on patient outcomes. Written materials were found to have a small to moderate effect size as compared to “routine care” on patient outcomes (0.43, 95%CI, [0.33, 0.53%]). Written information was also found to improve patient knowledge as compared to no written material. Based upon the findings of this review of 23 systematic reviews and meta-analysis, Friedman et al. concluded with the following practice guideline recommendations: (a) verbal teaching is the least effective strategy and should only be used in conjunction with another method, (b) audiotapes, videotapes, written materials, and lectures all have a positive effect on patient knowledge, anxiety, and satisfaction, and (c) the use of multiple teaching strategies is a good option for patient education. The findings of this review and practice guideline provide good support for the proposed practice change.

Synthesis of Appraised Literature

The critically appraised literature offer overall consistent findings. The combined results of the reviewed literature provide good quality evidence for using video and written education materials to provide sustained, increased knowledge levels on various health topics. The one systematic review, four RCTs, three non-RCTs, one descriptive study, and one practice guideline recommendation all consistently demonstrated increased knowledge levels in patients provided multimedia, written, or a combination of both education interventions. The non-RCTs focused on low-income (Eckman et al., 2012; Frosch et al., 2008), ethnically and racially diverse (Frosch et al., 2008; Wilson et al., 2010), Medicare and Medicaid (Eckman et al., 2012) adult patient populations, most comparable to that seen at the project health Center. The out-patient healthcare setting used in all but one study also added to the generalizability of the procedures and outcomes in formulating this practice change (Armstrong, Idriss, et al., 2011; Armstrong, Kim, et al., 2011; Ciciriello et al., 2013; Eckman et al., 2012; Friedman et al., 2011; Frosch et al., 2008; Schnellinger et al., 2010; Thompson et al., 2013; Wilson et al., 2010).

The critical aspects in developing this practice change included finding an effective, time-efficient, and readily available educational strategy for the patient population served at the EBP project implementation health center. Researchers within one study found supportive evidence for improving CVD knowledge scores amongst patients, but at the cost of requiring patients to arrive 90 minutes ahead of their scheduled appointment, thus not supporting the time-efficient criteria (Eckman et al., 2012). Despite another positive knowledge increase finding, another study using a 30-minute length video as an education intervention again violated the time-efficient criterion. Multiple studies reported data supporting the combined approach to education of both video and written materials used in conjunction to improve knowledge levels (Ciciriello et al., 2013; Friedman et al., 2011; Thompson et al., 2013; Wilson et al., 2010). Knowledge levels were reportedly increased for as long as six months after intervention with video or written materials, with video education materials improving lifestyle

behaviors such as exercise and diet (Eckman et al., 2012). In fact, 50% of patients provided with written educational materials after video education reported resourcing the written materials more than once (Wilson et al., 2010) while others offered written materials used these pamphlets to discuss the health topic with their healthcare provider (Frosch et al., 2008).

Best Practice Model Recommendation

Synthesis of the appraised evidence indicated that the best practice recommendation was to provide patients in the outpatient healthcare setting with educational materials consisting of a combination of video plus written brochures. Based upon this recommendation, video and written educational materials on CVD from expert authority sources were presented to underserved, at-risk patients seeking healthcare at a rural health center. The doctoral student proposed that implementing this best practice protocol would reveal that the use of video plus written education materials on CVD epidemiology, pathophysiology, and risk factors as compared to the standard practice of brief verbal education, would increase the CVD knowledge levels of adult patients with one or more risk factors for the development of CVD. Thus measurements of knowledge taken before and after reviewing these educational materials allowed the doctoral student to assess the effect of this educational strategy on increasing knowledge of CVD.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Participants and Setting

The EBP project took place in a health center located within Northwest Indiana. Qualified as an FQHC, this health center offers comprehensive medical care to uninsured, underinsured, and underserved patients regardless of their ability to pay. The providers at this health center include a team of four medical doctors and one nurse practitioner, each working full-time positions. Approximately 100 patients per day are cared for each day at this location, many with chronic conditions including hypertension, obesity, and diabetes (EBP Project Facility Nurse Practitioner, personal communication, May 31, 2013). The patients seen at this facility are almost exclusively Medicare, Medicaid, and uninsured individuals. The organization encourages each and every patient to use this health center as a medical home. However, due to the inability to afford even this reduced-cost health care, many patients do not seek annual health maintenance appointments (EBP Project Facility Nurse Practitioner, personal communication, May 31, 2013).

The mission and vision of this health center is to provide the highest quality, continuous, comprehensive health care to patients, regardless of age, sex, race, culture, or ability to pay. Specifically, their value statements include using acceptable performance improvement methods to improve the quality of care offered, as well as to promote health and prevent disease through individual, group, and community health promotion efforts. These goals were supportive of the purpose of this EBP project: to determine the effectiveness of an efficient, time-effective, video and written-based educational strategy to improve patient knowledge of cardiovascular disease.

The participants for this EBP project were patients over the age of 18 who were seeking care at this health center between September 25, 2013 and November 22, 2013. Individuals

with one or more risk factors for the development of CVD, as well as those with a known history of the disease were be included.

Outcomes

The main outcome evaluated and critically analyzed was consistent with that found in the literature for this EBP project. The intervention was expected to facilitate a two-point mean score increase in patient knowledge of CVD disease, as measured by the CVD knowledge assessment tool. Additionally, as consistent with a smaller number of studies, the proposed project was expected to improve patients reported discussion of CVD with their healthcare provider.

Intervention

This EBP project was designed to use an educational program comprised of both video and written materials to increase patients' mean scores of heart disease knowledge. A series of carefully devised steps, as detailed herein, was used to effectively carry out the proposed EBP project.

All patients over the age of 18 arriving at the EBP project implementation health center, beginning September 25, 2013 were offered a numbered packet with information regarding the EBP project upon signing in at the front desk (See Appendix B). Patients' decision to accept the packet or not did not affect their current or future care within the practice. The assistants at the front desk instructed those patients accepting the packet to, "Please read over the first page in this packet and follow the directions as indicated. If there are any questions please return to the front desk". Patients completed the first page of the CVD knowledge packet containing information used to identify patients with one or more risk factors for the development of CVD, and excluded those without any risk factors (See Appendix B). Patients who mark "yes" to one or more of the risk factors were directed, in writing, to proceed to (a) read the consent statement, (b) complete the demographic section, (c) and answer CVD knowledge pre-test questions. This process took no longer than five minutes and was conveniently completed

during the patient's time in the waiting room. Upon being brought back into the examination room, the nurse or medical assistant (MA) assessed the patient's vital signs and record them into the in-room computer (standard practice). For those patients who chose to participate, the nurse or medical assistant collected the completed previously numbered forms. Those patients choosing to participate then had a video titled *Living With and Managing Coronary Artery Disease* from the National Heart Lung and Blood Institute regarding coronary heart disease started on the portable DVD player in the examination room before the nurse/MA stepped out. The nurse or MA also provided the patient with the written educational brochure containing information about CVD from the CDC. This video played for the next four minutes, time which the patient normally spent waiting for the provider to arrive. Upon leaving the room, the nurse/MA placed the previously numbered pre-education questionnaire within a box labeled "In-Process EBP Forms" within the nurses' station, obtained a post-education questionnaire from a box labeled "Blank EBP Forms" within this area, filled in the participant's number, and secured the questionnaire to a clip located on the examination room door frame. Upon entering the room, the provider retrieved the numbered post-education questionnaire from the door and took it within the room. The patient was then seen by their normally scheduled provider (standard practice). At the completion of the visit, the provider presented the patient with the correspondingly numbered post-education knowledge test and asked the patient to complete the questions on the two pages and to wait for the nurse/MA to escort them to the front desk. The nurse/MA then returned to the examination room, collected the completed forms, and escorted the patient out and to the front desk (standard practice). The nurse/MA returned to the nurses' station and collected the form corresponding with the patient's pre-test number from the box within the nurses' station, stapled the form together with the first four pages of the packet completed before the visit, and placed them together into the secured, designated bin labeled "Completed EBP Forms" within the nurse's station.

Planning

A significant amount of planning and preparation was necessary to develop this EBP project. The doctoral student dedicated a significant amount of time to designing the data collection tools for the project as well as collaboratively formulating the heart disease knowledge test. A team force was fostered into development between the doctoral student and two of the health center healthcare providers, as consistent with Kotter's second stage in the eight stages of change. The detailed procedure for implementing this project was also carefully constructed in collaboration with another stakeholder nurse practitioner in the clinic. This team approach to shaping the vision of the EBP change was integral for the success of this endeavor. Following Kotter's stages of change, the next step the doctoral student took was to share the vision of the EBP change with others in the clinic. The doctoral student educated the other necessary staff members on the details of the project before the change was implemented. Staff members were guided through the procedures and assured that the doctoral student would be on hand for help and support multiple workdays per week throughout the implementation phase of the project. Consistent with the goal of this project being to create a time-efficient, effective educational strategy for the clinic, the doctoral student anticipated the specified plan for the EBP project would make the change as seamless as possible with the normal flow of work at the clinic.

Recruiting Participants

Upon signing in for their regularly scheduled appointment, all patients who were 18 years of age or older were asked to review a packet of information regarding this project. The face sheet of this packet contained an explanation of the project as well as one question regarding individual risk factors for CVD (See Appendix B). Based upon the patient's response to this one question, individuals were determined to be eligible or ineligible to participate. Following the determination of eligibility, patients may have continued reading through the packet and decided whether or not they wished to participate in the project.

Data

Reliability and validity of measures. Patient knowledge scores of CVD were measured to determine the effectiveness of the proposed EBP project. Consistent with the literature, patient knowledge were measured using the Heart Disease Questionnaire administered before and after the educational intervention. The implementation of a knowledge test uniquely created for the project's specified intervention was widely supported by the critically analyzed literature (Armstrong, Kim, et al., 2011; Eckman et al., 2012; Friedman et al., 2011; Frosch et al., 2008; Krawczyk et al., 2012; Schnellinger et al., 2010; Thompson et al., 2013). The ten-item knowledge questionnaire used within this EBP project was adapted from a previously established 30-item form. In 2011, Bergman et al. published an article outlining the process of creating a comprehensive heart disease knowledge questionnaire to be used by health professionals to evaluate patient knowledge of heart disease etiology, epidemiology, and symptomatology. This comprehensive heart disease questionnaire draws from questions found on existing, yet dated, scales, as well as educational groups such as the AHA, National Heart, Lung and Blood Institute, Centers for Disease Control and Prevention, and others (Bergman et al, [cited on p. 6], 2011). A total of 30 questions were developed and tested; a Kuder-Richardson score of 0.73 reflected the tool's reliability (Bergman et al., 2011). When tested within a group of 27 adults between the ages of 40 and 79, the mean 30-item scale score was 12.56 (*SD* = 3.84) (Bergman et al., 2011).

However, the problem with using the Bergman et al. (2011) knowledge test in its entirety was that it was not an accurate measure of patient knowledge for this EBP; the items queried included topics not covered in the proposed educational intervention. Therefore, as consistent with the literature, a shortened and individualized knowledge test was needed. The doctoral student, together with two other nurses, selected the ten questions from the established Bergman et al. (2011) tool that best reflected the content contained within the educational video used in this project. This EBP project-specific ten-item questionnaire was expertly validated by a

third nurse as well as a content expert: a regional primary care physician, with more than 30 years of experience, who worked within the health care facility.

Collection of data. Data collection commenced with patients completing the project forms upon signing in for their scheduled appointment. The information gathered from each patient was limited to their responses provided on this packet of information (see Appendix B). The forms were pre-coded with a number to allow for the first four pages and the subsequent two pages to be matched up appropriately so that knowledge could be compared prior to and following the educational intervention. There were no patient identifiers on these forms nor were the coded numbers from the forms in any way tied to the patient record. The nurse or medical assistant collected all completed packets after they were filled out by the patient, and were placed in a designated secured box, labeled “Completed EBP Forms”, within the nurses’ station. At the end of each workday, these forms will be secured within a locked drawer within the nurses’ station. At the end of each business week, the doctoral student collected the completed forms and placed them in a locked drawer within her home for future data analysis. The supply status of available forms in the clinic was also evaluated on a weekly basis to ensure adequate copies were available.

Management and analysis. The impact of the educational intervention on patient knowledge was measured using pre- and post-tests. This method of assessment allowed the doctoral student to measure knowledge scores to determine if the educational intervention resulted in a mean change in patient knowledge of CVD. Patient demographics were also gathered and summarized using descriptive statistics to describe the participating patient population. Mean scores on the CVD knowledge assessment were calculated and compared with pre- and post-intervention scores for each individual. Mean differences in knowledge scores within and between groups of patients were then analyzed using *t*-tests.

Protection of Human Subjects

Protection of human subjects has been a key factor throughout development of this EBP project. In order to ensure compliance with the ethical research principles set forth by the 1978 Belmont Report, the doctoral student completed web-based training through the National Institutes of Health course on protecting human research participants. The project also successfully underwent Valparaiso University Institutional Review Board (IRB) review to ensure compliance with these national guidelines.

CHAPTER 4

FINDINGS

The purpose of this evidence-based practice project was to determine the effectiveness of an educational intervention to improve CVD knowledge among adults with one or more risk factors for the development of CVD within a Northwest Indiana FQHC clinic. Specifically, the project was developed to determine if education, in the form of video plus written materials, would improve mean CVD knowledge scores within this underserved, high-risk population. The following data analyses feature participant characteristics and project outcomes, comparing the mean CVD scores of participants before and after the educational intervention.

Sample Characteristics

A total of 100 patients, 73 females and 27 males, initially consented to participate in the project. Ages of these individuals ranged from 18 to over 65 with the majority of patients (*N* = 55) aged 41 years and older (see Figure 4.1). Seventy-two percent identified themselves as Caucasian, as compared to African American (15%), Hispanic (6%), Native American (1%) or other (2%). Consistent with the population reportedly served at this health center (i.e., uninsured, Medicare or Medicaid recipients), the project population consisted of 37% patients without insurance, and 19% Medicaid and 6% Medicare recipients. Another 33% of participants reported having private insurance. With regards to educational levels, 41% of participants reported having a high school degree, GED, or less; while another 31% reported to have obtained only “some” college education. Thirteen percent of participants indicated they held an associate-level degree, and only 12% of those participating in the project had obtained a bachelors or higher level degree.

In addition to basic demographic data, participants were asked to indicate the reason for their visit at the health clinic (see Figure 4.2). The greatest proportion of patients (*n* = 28; 28%) indicated their appointment was for a sick visit, while 24% indicated they were presenting for a

medication refill, and another 19% made their appointment to review lab results or follow-up on a previous visit. Only 4% of patients indicated their visit was for an annual health visit. Lastly, information was collected from patients regarding potential risk factors for developing CVD. Patients were simply asked to mark any and all of the health conditions listed that applied to them (see Table 4.1 and Appendix B).

Of the total 100 initial patients who began participating in the EBP project and provided demographic and risk factor data, only 57 individuals completed the entire project. Thus, an attrition rate of 43% was noted. A chi-square test for independence was conducted comparing the demographic data of the group of patients who completed the entire project to those who chose not to answer the post-test questions. There was no statistically significant difference found between these two groups on gender (p = .859), education (p = .326), age (p = .059), race (p = .885), insurance type (p = .220), reason for visit (p = .655), or total number of CVD risk factors (p = .537). Thus the 57 total participants, 15 males and 42 females, who completed the entire EBP project were considered to be a representative sampling of the 100 initial participants and the adult patients seeking care within the clinic.

Instrument Reliability

The knowledge questionnaire was comprised of 10 questions, each with three optional responses: “True”, “False”, or “Don’t Know”. A total score of 10 was possible on each test. The internal consistency of the modified knowledge assessment test was determined using Cronbach’s alpha. The original 30-item CVD knowledge test, from which the shortened version used in this project was created, had a reported internal consistency rating of 0.73 (Bergman et al., 2011). The Cronbach’s alpha score for the modified CVD knowledge pre-test used within this project was 0.697. For the post-test, a Cronbach’s alpha score of 0.533 was obtained. Thus, this modified CVD knowledge tool had good overall internal consistency.

Figure 4.1. Participant Ages by Group.

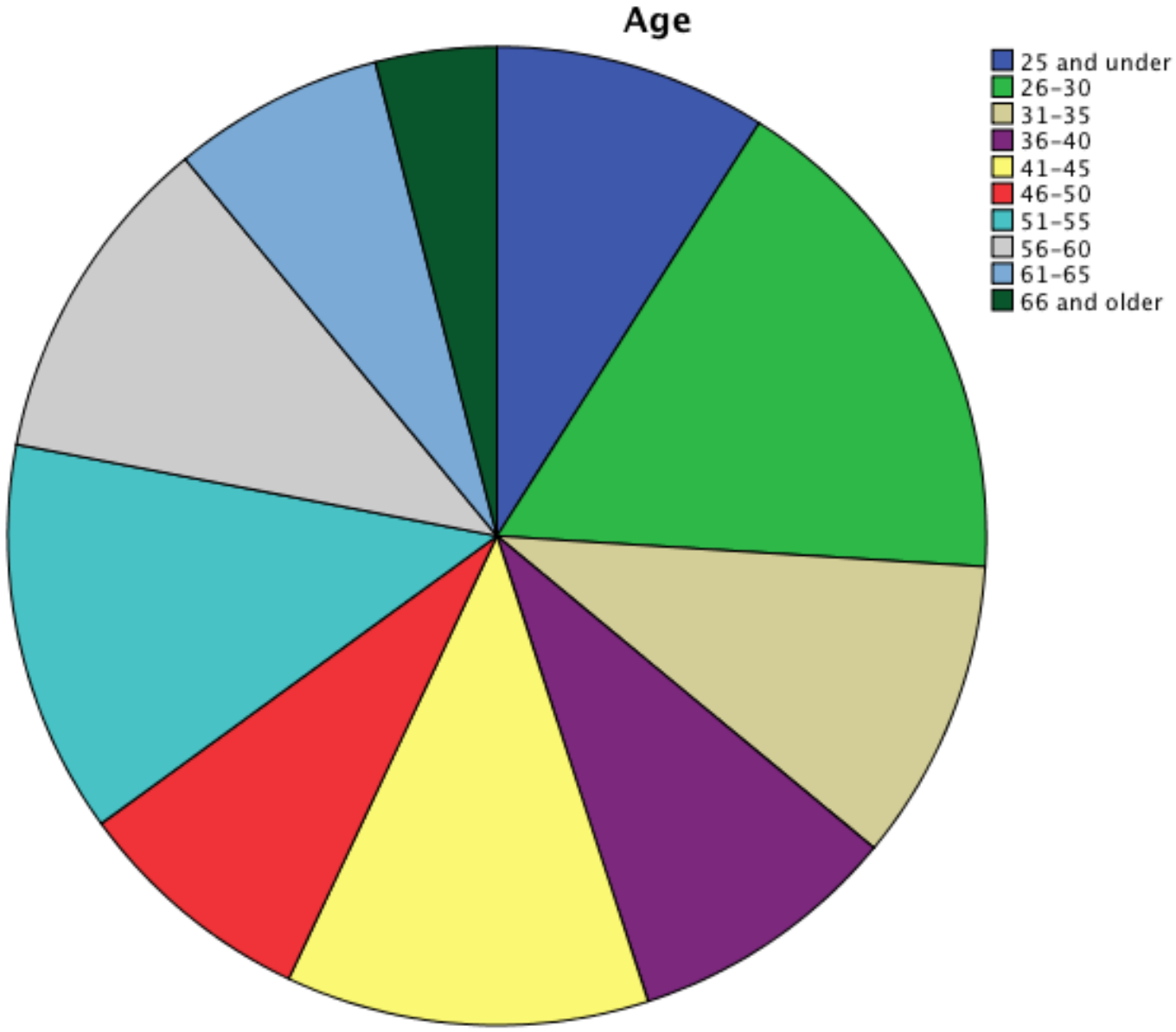

Figure 4.2. Patients' Reason for Healthcare Office Visit.

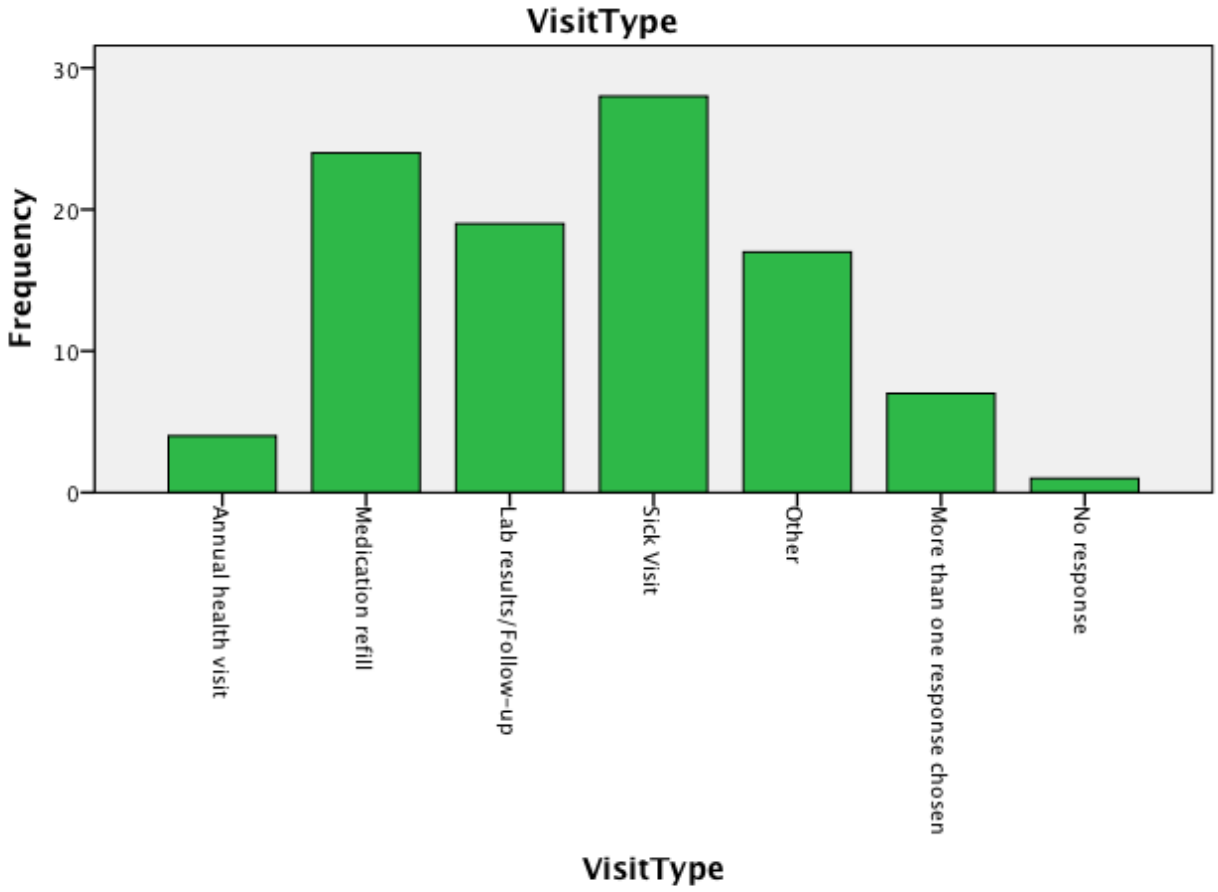

Table 4.1

Patient Self-Reported Health Conditions: CVD Risk Factors

Risk Factor	Frequency (%) (*n* = 100)	Results (*n* = 57)
Tobacco Use	36%	38.6%
High Cholesterol Levels	28%	26.3%
Diabetes	10%	7%
Hypertension	41%	42.1%
Taking Antihypertensive Medication	39%	42.1%
Overweight or Obese	67%	66.7%
No Regular Exercise	68%	71.9%
High Fat, High Processed Food Diet	34%	31.6%
Poor Dietary Intake of Fruits or Vegetables	56%	59.6%
Frequent, High Alcohol Consumption	7%	7%
First-Degree Relative with CVD	37%	40.4%
Personal History of CVD	16%	15.8%

Statistical Testing and Significance

To determine the effectiveness of the educational event, detailed statistical analyses were performed using the commercially available IBM SPSS Statistics software, version 21. An analysis was conducted to answer the proposed PICOT question using a paired samples *t*-test to compare mean pre and post-test scores. Additional independent samples *t*-tests were completed to compare knowledge score changes between genders. Secondary analysis, including bivariate correlations using Pearson correlation coefficient, compared change in knowledge scores and total CVD risk factors. Chi-square tests for independence were completed, looking for any relationships between the changes in knowledge scores and patient demographics. Lastly, frequency distributions were analyzed regarding the benefits of the provided educational intervention. Statistical significant for all analysis was established as $p < .05$.

Findings

There was a statistically significant increase in patient CVD knowledge mean scores of 1.703 points, from a pre-test score of 5.850 ($SD = 2.415$) to a post-test score of 7.554 ($SD = 1.801$) following the video and written educational intervention ($t(56) = 5.887$, $p < .001$). Although females scored higher in the pre-test at a mean score of 6.166 compared to males at 4.966, this difference was not statistically significant ($t(55) = -1.678$, $p = .099$). Rather, the educational intervention was found to be equally effective for both men and women, as evidenced by a mean change in knowledge score of 1.985 for males and 1.602 for females ($t(55) = .579$, $p = .565$). Furthermore, the educational intervention was equally effective across all patient demographic variables. There was no significant difference in change in knowledge scores between the pre and post-test with regards to gender ($X^2 = 24.642$, $p = .742$), education ($X^2 = 170.515$, $p = .979$), age ($X^2 = 275.440$, $p = .397$), race ($X^2 = 95.775$, $p = .949$), type of insurance ($X^2 = 197.887$, $p = .065$), or reason for office visit ($X^2 = 162.086$, $p = .827$).

Interestingly, there was no statistically significant correlation found between the mean change in CVD knowledge scores and the number of CVD risk factors among participants (r (55) = -.211, p = .115).

In addition to a change in knowledge, participation in the intervention produced changes in attitude and intended behaviors. A total of 50.8% (n = 29) of patients claimed that the educational intervention prompted them to discuss their CVD risk factors with their healthcare provider that same day, while another 68.4% (n = 39) of respondents said they would share this new CVD knowledge with others. The majority (n = 42; 73.7%) of patients claimed the video in particular was helpful in facilitating their understanding of CVD risk factors, and 68.4% (n = 39) of patients claimed that the educational intervention provided would result in making lifestyle changes to reduce their personal CVD risk factors.

CHAPTER 5

DISCUSSION

The results of this EBP project provide support for the efficacy of a multimodal educational method to educate patients on CVD in the ambulatory healthcare setting. The purpose of this project was to answer the PICO question: In adult patients with one or more risk factors for CVD, does the addition of video plus written educational material on CVD epidemiology, pathophysiology, and risk factors as compared to standard of practice of abbreviated verbal education, provide a mean score increase in patients' knowledge of CVD? Despite statistically significant results supporting the efficacy of this educational method in increasing patient CVD knowledge scores, careful analysis of the factors contributing to the successful implementation of the EBP project will be discussed herein, including ways in which Kotter's eight steps of change and the Stetler Model influenced the project's success.

Explanation of Findings

Data were collected using pre and post-education CVD knowledge questionnaires as well as through the use of demographic forms. Analysis was completed using IBM SPSS Statistics software, version 21. Changes in patient knowledge scores were examined as well as descriptive statistics of the patient population and their feedback on the educational intervention. The CVD knowledge assessment tool used for this EBP project was a shortened version of a previously established CVD knowledge tool that had established reliability and validity (Bergman et al., 2011). This EBP project-specific, 10-question CVD knowledge tool used was also found to have good internal consistency, as determined through calculation of Cronbach's alpha scores of 0.697, and 0.533 for the pre- and post-tests, respectively. The educational materials used consisted of a readily available, cost-effective, and time efficient, 3-minute video from the National Heart Lung and Blood Institute regarding coronary heart disease, and a one-page

written hand-out containing information about CVD from the Centers for Disease Control and Prevention.

Of the total 100 patients with one or more CVD risk factors who initially completed the demographics portion of the EBP project, a total of 57 completed the entire project; those 43 participants who did not complete the final questionnaire did not differ by gender, race, educational level, insurance type, reason for visit, or number of CVD risk factors than those completing then entire project. For participants completing the entire project, paired *t*- tests were used to compare the mean CVD knowledge scores for patients at baseline, and then immediately after the video plus written CVD education. Answering the posed PICOT question for this EBP project, a statistically significant mean increase in knowledge scores of 1.703 points (5.850 vs. 7.554; maximum possible score = 10) was found amongst the patients ($p < .001$). Differences in mean knowledge scores at baseline were noted between males and females, although this difference was not statistically different, nor was the mean change in knowledge scores between these two groups statistically different. Interestingly, there were also no statistically significant differences in change in knowledge scores amongst any of the demographic variables, including age, education, race, type of insurance, and reason for medical visit. There was also no significant relationship found between patient's change in CVD knowledge scores and the number of CVD risk factors present.

The evidence (one systematic review, four RCTs, three non-RCTs, one descriptive study, and one practice guideline recommendation) used to support this EBP project consistently demonstrated increased knowledge levels in patients provided multimedia, written, or a combination of both education interventions. Reproducible outcomes were found within this EBP project. Within the literature used to support this EBP, knowledge score changes ranged from a mere one point to more than two points. Thus, the doctoral student set a high target goal of obtaining a two-point mean score increase in CVD knowledge levels as an indicator of project success; unfortunately, this goal was not obtained. However, the 1.7 point score increase was

still consistent with increases found in the supportive literature (Armstrong, Idriss, et al., 2011; Armstrong, Kim, et al., 2011; Frosch et al., 2008; Krawczyk et al., 2012; Thompson et al., 2013).

Interestingly, there was a significantly greater number of female patients than males who participated in the EBP project. This trend was thought to be related to the fact that two of the three providers at this clinic were females themselves, and possibly had a greater number of female patients in general. However, it has been well documented in the literature that females, in general, are more likely than males to participate in any given survey, and this factor is a more likely rationale to this notable variance (Curtin, Presser, & Singer, 2000; Smith, 2008). The difference in baseline CVD knowledge scores between women and men (Females, *M* = 6.116 vs. Males, *M* = 4.966) was a thought-provoking secondary outcome in this project. This variance may in part be due to national campaigns within recent years focusing on increasing female knowledge of CVD, such as the *Go Red for Women* project from the American Heart Association.

Consistent with Frosch et al. (2008) and Schnellinger et al. (2010), the majority of patients (50.8%; *n* = 29) participating in this EBP project reported that they would discuss the CVD education information provided to them with their healthcare provider. An even greater portion of patients in this EBP project (68.4%, *n* = 39) claimed they would make lifestyle changes as a result of the education provided, again consistent with similar findings of positive behavior changes found within the literature (Armstrong, Idriss, et al., 2011; Eckman et al., 2012).

Evaluation of the Applicability of the Theoretical and EBP Framework

Two frameworks were used to guide the development, implementation, and evaluation of this EBP project: Kotter's eight steps of change and the Stetler Model of evidence-based practice. The applicability of each of these frameworks in this EBP project is discussed herein.

Kotter's Eight Steps of Change. Kotter's eight steps of change include (1) creating a sense of urgency, (2) building a team force, (3) shaping a vision and strategy, (4) sharing the

vision buy-in, (5) removing barriers and empowering action, (6) celebrating short-term wins, (7) continuing the change process, and (8) maintaining the change.

In this first of the eight steps towards change, a sense of urgency to change the way patients were taught about CVD risk factors was highlighted amongst key stakeholders within the facility. Education became the key role, and having facts and research data to support these educational talking points helped to highlight the importance of this project as well as the potential benefit it could bring for the clinic and their patients. Next, a coalition of key stakeholders including one full-time nurse practitioner, two registered nurses, and one receptionist were gathered, and these individuals were charged with a leadership role in helping to facilitate this important practice change. Individual roles in this process were discussed and procedural steps for this EBP change were reviewed in detail. Shaping the vision and strategy for change, the third step in the process, involved creating a vision of how this EBP change would be implemented in a nearly seamless fashion within the clinic. The key stakeholders were relieved to know that the steps to this practice change would not significantly change their current operational flow. In step five of this process, removal of barriers towards effecting change was completed. As implementation was underway, the doctoral student recognized the need for reminders to the procedural steps of this EBP change. Thus, in attempts to remove the barrier to proper implementation, signs including the implementation steps of the EBP procedure were placed in the nurses' station and at the front desk. Also, a stack of post-test quizzes was added to each of the two hallways of patient rooms in order to help facilitate the process of ensuring all patients also received a post-test questionnaire form. Step six of Kotter's change model includes celebrating short-term successes. A small Halloween candy celebration shortly after the project implementation began; then, a celebration with home-baked goods was used to celebrate the short-term success of this change process. Consistent with step seven of Kotter's change process, weekly evaluations on the progress of the EBP project were shared with team members in order to recognize their positive assistance in this process and to help

facilitate continued success of this change implementation. Lastly, as the collection of data came to a close, team leaders were encouraged to continue using the written and video education for patients at risk for CVD.

Overall, Kotter's eight steps of change served as a successful framework for implementing this EBP change within the health center. The step-wise approach of this framework provided a significant strength as this allowed the doctoral student to use the stages as a guide in successfully progressing through the implementation phase of this EBP project. Another major strength of using Kotter's change model included the emphasis on a team-approach to creating change. The development of a team of leaders to help carry out this change within the health center helped teach others how EBP change can be implemented and sustained into the future, long after this particular project has been completed. A limitation to the use of Kotter's eight stages however, included the somewhat lengthy and laborious process of completing the eight stages. It is recommended that future projects dedicate significantly greater time to progressing through Kotter's eight stages of change in order for the change process to occur more gradually and naturally over time.

Stetler Model of Evidence Based Practice. While most models of EBP share the common components resembling the core definition of EBP, the Stetler Model was selected to guide this EBP project for two major reasons: (a) the model focuses on critical thinking and use of research findings and (b) the model is practitioner-oriented (Stetler, 2001). The five stages of the Stetler Model consist of (1) preparation, (2) validation, (3) comparative evaluation and decision making, (4) translation and application, and (5) evaluation. Progression through these five stages of the Stetler Model was facilitated simultaneously with the use of Kotter's eight steps of change.

In the first step of the Stetler Model, preparation, the doctoral student identified the need for a change in education strategy at the EBP implementation health center while completing clinical hours within the setting. Discussion of the problem with another key stakeholder

clinician, as well as identification of the AHA 2013 health guidelines for improving CVD knowledge particularly amongst low SES groups (Pearson et al., 2013) confirmed the need for this practice change. Time was dedicated to evaluating the environmental factors that could influence this proposed practice change. Consolidation of the goal into a concise purpose statement and PICOT question format then guided the initial search for relevant evidence to guide this EBP project.

Using step two of the Stetler Model, research findings were critiqued with a focus on their practice applicability (Stetler, 2001). The doctoral student completed a systematic search of the evidence and critically evaluated the resources for use within this project following the Melnyk and Fineout-Overholt (2005) rapid critical appraisal tools. The included resources were then ranked using the Melnyk and Fineout-Overholt (2005) rating system for the hierarchy of evidence.

Following step three of Stetler's Model, the doctoral student scrutinized the evidence to determine whether or not its use within the designated health center would meet the determined educational strategy need. The educational strategy supported within the evidence was also evaluated for overall feasibility within this setting. The doctoral student determined that the evidence supported using the intended CVD educational strategy and implementing this change within the designated clinical setting was not only feasible, but also would pose low-risk and provide potentially high-net benefit for the patient population. Stressed as highly important by key stakeholders at the health center, the proposed educational change was also designed by the doctoral student to be cost-effective, and time-efficient. In phase four of the Stetler Model, using helpful input from a nurse practitioner at the health center, the doctoral student outlined a detailed plan for intervention that delineated the steps for carrying out the specific EBP change. This EBP change was implemented using Kotter's eight steps of change as a guide.

The final step in the Stetler Model, evaluation, was undertaken through individual patient data collection using the carefully formulated data packets, as well as through the doctoral

students' observations of the practice change process within the health center. Early on in data collection, it was noted that adherence to the change plan was difficult for some staff members helping to implement this change. The patient load handled at this health center, combined with an unexpected change in staff turnover, added to the challenge of effectively implementing this EBP change while simultaneously collecting data on the process itself. In order to increase compliance, the doctoral student provided detailed procedural briefings to the necessary individuals on a regular basis and provided written reminder signs with the steps of the process. Both of these interventions were found to be helpful upon staff evaluation.

Overall, the Stetler Model served as an effective framework to guide this EBP project. Together with Kotter's eight steps of change, these two frameworks were used as a checklist style guide to ensure the doctoral student progressed through all the necessary stages to properly implement this EBP change. The doctoral student felt that the Stetler model proved to be an effective framework to be used by an individual practitioner; this opinion aligns with the consensus found within the literature (Ciliska et al., 2011).

Strengths and Weaknesses of the EBP Project

Evaluation of the EBP project by the doctoral student revealed a number of strengths and weaknesses. Careful consideration of both the strengths and weaknesses within this process will provide an objective view of potential contributing and inhibiting factors, as well as ways in which similar future endeavors could be improved.

Strengths. Implementation of the EBP project multimodal CVD education in an ambulatory health center was effective in increasing at-risk adult patient's knowledge levels of CVD. Additionally, this EBP project facilitated increased communication regarding CVD between these at-risk adult patients and their healthcare providers. The AHA has called for increased educational programs and materials regarding CVD be targeted at our at-risk patient populations (Pearson et al., 2013). Additionally, it is a *Healthy People 2020* goal to increase the number of adults who are aware of the signs and symptoms of heart attack and stroke (U.S.

Department of Health and Human Services, 2013b). This EBP project was able to make an impact towards achieving these goals.

The second major strength of this EBP project was the convenience of this educational change. Integration of this EBP practice change was a near seamless fit with the normal flow of work within the health center. By design of the EBP project, patients were not required to spend any extra time in the health center or show up for any additional appointments. Equally important, the healthcare providers were also not belabored by any additional time restraints with implementation of this EBP project. Arguably the most inconvenienced by this change were the nurses within the health center, however; even they claimed the method of implementation was convenient. Through the support of the health center staff, this project was not only made possible, it became a successful endeavor.

Weaknesses. Despite the positive outcomes of the EBP project, successful implementation did not occur without its limitations. Administration of the EBP data packets, as well as the educational video and written information, was dependent upon staff member commitment to the EBP procedure process. The front desk workers were responsible for a variety of tasks, because of which they often cited being “too busy to remember” to offer patients the EBP information packets. The doctoral student identified this barrier early in the implementation process and made adaptations: i.e., posting reminders to hand out the packets, displaying a sign for patients to ask about how they could participate in the EBP project, and providing encouragement to the front desk staff to continue assisting in this important EBP change process.

At times, the nurses helping facilitate the EBP process also cited being “too busy” to remember to provide a post-test form to every patient or would forget to collect the pre-test form before the video and written information were provided. In attempt to correct this following Kotter’s fifth step in the change process, removing barriers, the doctoral student provided reminder signs for the steps of the EBP process for the nurses and also ensured that the nurses

working in the clinic on any given day were aware of the EBP process and their role in helping facilitate this change.

A second limitation to the EBP process was the limited percentage of eligible patients who completed the data collection portion of the project. By design, the EBP project procedure was created in compliance with strict ethical standards and principles of anonymity and confidentiality. As a result, patients were not identifiable by their data collection packet, pre-test or post-test forms. Unfortunately, at times this lead to an decreased participation rate due to misplaced pre-test forms and nurses and providers being unaware of who completed which form and who indeed still needed to complete a post-test. Still, even when the procedural process was followed, a number of patients did not complete the EBP data collection packets in their entirety. The doctoral student hypothesized that this group of individuals who did not complete the packets and those who did might be differentiated on some demographic characteristic. However, statistical analysis of the demographic and CVD risk factor information between these two groups identified them as homogenous samples.

A third limitation to this EBP project was the doctoral student's role in the health center facility as a student, and not one of a fellow employee. Throughout the project implementation, an ongoing monitoring of the EBP change process brought to light a lack of leadership present in the health center. Using Kotter's eight steps as a guide, the doctoral student made continuous attempts to circumvent this limitation through ongoing communication with the key-stakeholder coalition formed in the early EBP development process. However, the doctoral student's position as an "outsider" as well as a "student" made effective change a difficult process. It is thought that change may have occurred more swiftly and efficiently if the project leader were employed within the clinic.

Implications for the Future

Practice. Based upon the positive outcomes of this EBP, it is recommended that implementation of video plus written education on CVD continues at this health center. A greater

focus on educating the at-risk population served in this health center needs to be made, and the evidence from this project indicates that the multimodal education does have favorable effects. With the removal of the data collection portion of the project, the process designed and used for this EBP change fits seamlessly with the normal flow of operations in the health center. Thus continuation of the change is expected at this health center, with the potential for the change to also occur in the other locations of this parent organization. It is also recommended that other health centers, particularly other FQHCs, explore their current standards of education practices with regards to CVD and the risk factors for this disease. This project targeted the adult population who self-identified as having one or more risk factors for CVD. Future practices could be widened to target all adults seeking health care at this location, as they too can benefit from knowing what the risk factors are for developing CVD.

It is also assumed that with such success in using the video plus written education modality of teaching about CVD and its risk factors, this effective teaching method might be applied by healthcare providers in practice to other health conditions with modifiable risk factors. As research supports, education is the first step towards effecting behavioral changes among patients (Homko et al., 2008; Kling et al., 2013; Lynch et al., 2006). Nurse practitioners in particular are in pivotal positions to enact such changes to their practice, particularly as they are celebrated for their focus on education and disease prevention. Thus, if this combination teaching method were to be applied to other health topics (e.g., osteoporosis, diabetes, and hypertension), the health of the patient population served could be further improved. Providing education in the most effective manner not only follows the ethical commitment to provide the standard of care for patients, but it also offers patients the tools they need to make more informed decisions about their health.

Theory. Kotter's eight steps of change were used as a framework to effectively guide the implementation of this EBP change. The doctoral student heavily relied upon each stage, effecting change in a step-wise fashion. Kotter's eight steps have been successfully applied to

organizational change processes for over two decades; however, these changes have most often been cited as taking place in areas other than the healthcare setting (Kotter, 1996). Despite this, Kotter's eight steps have demonstrated direct applicability for change in settings including healthcare through its use this EBP project. It is proposed that with continued use by others leading EBP change in the healthcare setting and publishing of the work, Kotter's eight steps may become synonymous with impacting change in the healthcare arena.

Research. The review of literature undertaken at the beginning of this EBP project helped to establish that sufficient sources of knowledge regarding multimodal educational strategies, including video plus written strategies implemented in the ambulatory healthcare setting, exist. A variety of educational topics have been tested using video and written educational teaching modalities; however, the need for research focusing on CVD in particular was uncovered through this EBP process. Future nursing research endeavors might explore both the immediate and long-term effects that video and written education have on patients' knowledge and health behaviors. Additionally, researchers could also focus on the impact of multimodal education strategies focused on CVD and patient outcomes in terms of risk factors or disease progression.

Education. The positive outcomes of this EBP project have a direct impact on the future education of nurses and APNs. Professionally, nurses and APNs alike pride themselves in their commitment to patient education and empowerment. This skill is taught early on in nursing school and is reinforced as an important aspect of patient care. The outcomes of this EBP indicate that nursing education should contain information regarding the use of video and written educational materials as effective tools for improving patient knowledge levels. As a result, these nurses and APNs may be more inclined to implement multimodal educational strategies in their own practices. It is also important to share the findings of this EBP project with other healthcare providers working in ambulatory care settings. With widespread implementation of video and written education on CVD, the *Healthy People 2020* goal of increasing the number of

adults who are aware of the signs and symptoms of heart attack and stroke could potentially be achieved (U.S. Department of Health and Human Services, 2013b).

Conclusion

Implementation of a video and written CVD education process was integrated into a rural Midwest outpatient health center. Over the 8-week implementation period, a total of 100 adult patients were (a) asked to view a 3-minute video developed by the NHLBI and (b) provided a written handout on CVD risk factors authored by the CDC before their regularly scheduled appointments. Along with demographics information and data on the individuals' risk factors for CVD, pre- and post-test knowledge assessments were collected to evaluate the effectiveness of the intervention. Kotter's eight steps of change and the Stetler model served as frameworks for the development and implementation of this EBP. For the 57 patients who completed the EBP project, data analysis using a paired sample *t*-test revealed a statistically significant increase in patient CVD knowledge by 1.7003 points. Secondary outcomes of this EBP process indicate that the majority of patients participating in the multimodal education will discuss CVD and its risk factors with their healthcare provider in the future. More than half of participants also claimed that participating in this educational intervention provided an impetus for them to make lifestyle changes to reduce their personal risk factors for CVD, the number one killer of American men and women.

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BIOGRAPHICAL MATERIAL

Lauren A. Ostrowski-Winkler

Lauren's nursing career commenced in 2010 upon graduation from Valparaiso University with a Bachelor of Science in Nursing. Since then, Lauren has worked as a telemetry nurse at Saint Mary Medical Center in Hobart, Indiana. Through her work at the hospital, Lauren was inspired to fulfill the role of a primary care provider for patients and families across the lifespan. Lauren returned to Valparaiso University in 2011 to accomplish this goal and will graduate with a Doctorate of Nursing Practice degree in May 2014. Within the FNP curriculum, Lauren has witnessed the disparity in health care education provided within an underserved population in Northwest Indiana. Her experience with patients in this population led to the development of an evidence-based intervention to increase CVD knowledge. The ultimate goal of this EBP project was to provide patients with the tools necessary to motivate them to make the lifestyle changes to reduce their risk for CVD. Lauren will be sharing the findings of this DNP project at the American Association of Nurse Practitioners National Conference in Nashville, Tennessee in June of 2014. Lauren is a member of Sigma Theta Tau International Honor Society of Nursing, the American Association of Nurse Practitioners, and the Coalition for Advanced Practice Nurses of Indiana. Upon earning her DNP degree and becoming a board certified family nurse practitioner, Lauren plans to work in the primary care setting.

ACRONYM LIST

AHA: American Heart Association

ANOVA: Analysis of Variance

CDC: Centers for Disease Control and Prevention

CVD: Cardiovascular disease

EBP: Evidence-based practice

FQHC: Federally Qualified Health Center

NHLBI: National Heart, Lung, and Blood Institute

PICOT: Population, Intervention, Comparison, Outcome, Time

REALM: Rapid Estimate of Adult Literacy in Medicine

RCT: Randomized control trials

SES: Socioeconomic status

SPSS: Statistical Package for the Social Sciences

APPENDIX A
Evidence Data Table

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Armstrong Idriss & Kim (2011) *Patient Education and Counseling* Effects of video-based, online education on behavioral and knowledge outcomes in sunscreen use: A randomized control trial *Level II*	• 94 adult patients at a University-based outpatient medical center	• RCT (*n* = 47 intervention; *n* = 47 control) • Intervention of online video compared, control of pamphlet with identical information regarding sunscreen use and effects of sun exposure • Knowledge and sunscreen behavior assessed before and 12-weeks after intervention	• Knowledge and sunscreen behaviors • Significant improvement in knowledge scores for both groups at 12 weeks: (8.8 +/- 1.4, 7.6 +/- 1.2, respectively, $p < 0.001$) • Inter-group analysis reveals significant improvement for video intervention group vs. control (2.0 +/- 1.5, 1.2 +/- 1.0, $p = 0.003$) • Improvement in sunscreen application behaviors in number of days per week for video vs. control group (1.9 +/- 2.3, 0.2 +/- 0.5, respectively, $p < 0.001$)
Armstrong Kim et al. (2011) *Journal of the American Academy of Dermatology* Online video improves clinical outcomes in adults with atopic dermatitis: A randomized controlled trial *Level II*	• 80 adult patients at a University-based outpatient dermatology clinic	• RCT (*n* = 40 intervention; *n* = 40 control) • Intervention of online video compared to control of pamphlet with identical information regarding atopic dermatitis • Knowledge and POEM scores assessed at baseline and 12-weeks after intervention	• Knowledge and POEM scores • Significant improvement in knowledge scores for both groups at 12 weeks: (12.75 +/- 1.76, 91% CI; 11.65 +/- 2.14, 83% CI respectively, $p < 0.001$) • Inter-group analysis reveals significant improvement for video intervention group over control (3.05 +/- 2.16, 1.85 +/- 1.94, $p = 0.011$) • Significant improvement (decrease) in POEM scores for video vs control group at 12-weeks ($p = 0.0043$)

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Ciciriello et al. (2013) *Cochrane Database of Systematic Reviews* Multimedia educational interventions for consumers about prescribed and over-the-counter medications (review) *Level I*	• Across the lifespan • Settings not specified • Industrialized nations	• Systematic review of 24 reviews and meta-analysis from 1982-2011 • Interventions included medication educational strategies in the form of (a) interactive or tailored multimedia in video or audio format, or (b) combinations of video plus text or text plus audio	• Patient or caregiver knowledge and skill acquisition; health behaviors or outcomes • 6/10 studies had adequate data for meta-analysis • Patient knowledge at 4-weeks was greater in multimedia group than usual or no education, *SMD* = 1.04, 95% CI [0.49, 1.58] • Multimedia education more effective at increasing knowledge when combined with written or brief verbal education, *MD* = 24.55%, 95% CI [22.34, 26.83%]
Eckman et al. (2012) *Patient Education and Counseling* Impact of health literacy outcomes and effectiveness of an educational intervention in patients with chronic diseases *Level III*	• 170 low-income, Medicare and Medicaid adult patients • Outpatient hospital-based internal medicine offices	• Controlled trial without randomization; sequentially assigned to one of two study groups: video plus written education (*n* = 83); or 2) written education (*n* = 87) • Knowledge assessments at baseline, post-intervention, and six months	• Post-intervention knowledge scores improved slightly more in video plus written vs. written only education groups (1.41 vs. 0.81, *p* = 0.07) • Video plus written education group demonstrated significantly improved health behaviors of exercise, diet, and weight loss compared to the written only group

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Friedman et al. (2011) *Journal of Cancer Education* Effective teaching strategies and methods of delivery for patient education: A systematic review and practice guideline recommendations *Level VII*	• Across the lifespan • Settings not specified • Industrialized nations	• Systematic review of 23 reviews and meta-analysis from 1995-2009 for the purpose of a practice guideline recommendation • Interventions included teaching strategies in the form of lectures (1), discussions (1), computer technology(11), written materials (6), audiotapes (7), videotapes (7), verbal (3), demonstration (1), and other (2)	• Outcomes grouped into three categories: patient knowledge, anxiety, and satisfaction • Effect sizes could not be computed due to differences in reporting across studies • Practice guideline recommendations: (a) verbal teaching as least effective and only to be used in conjunction with another method (b) audiotapes, videotapes, written handouts and lectures effective in reducing anxiety, increase knowledge and satisfaction, and (c) multiple teaching methods is best strategy
Frosch et al. (2008) *Patient Education and Counseling* Using decision aids in community-based primary care: A theory-driven evaluation with ethnically diverse patients *Level III*	• Ethnically and racially diverse, low income adult patients • Urban outpatient primary care clinic	• Quasi-experimental • Sequential assignment into two groups: (n = 100) video education or (n = 107) written brochure education • Role preferences in decision making assessed pre-intervention, and again post-intervention along with knowledge about prostate and colon cancers	• Knowledge scores were significantly improved in the video intervention group as compared to the written group, F (1,79.73) = 11.23 and F (1,115.99) = 11.15, respectively, (p = 0.001)

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measure
Krawckyk et al. (2012) *Journal of American College Health* How to inform: Comparing written and video education interventions to increase human papillomavirus knowledge and vaccination intentions in young adults *Level II*	• University under-graduate students • Industrialized nations	• An RCT of 200 students randomized into three groups based upon delivery method of education: (a) written (n = 61), (b) video (n = 74), or (c) control (n = 65) • Treatment arms of the study received identical materials on HPV and the HPV vaccine • Control arm received general education regarding cancer	• Pre- and post-intervention knowledge differences between groups completed with ANOVA • Significant increases in knowledge for both written and video intervention groups (M = 6.98, M = 5.21, respectively, p < 0.05) • Differences in knowledge gained were not statistically significant between video and written education groups
Schnellinger et al. (2010) *Pediatrics* Animated video vs pamphlet: Comparing the success of educating parents about proper antibiotic use *Level II*	• Adults seeking non-urgent care for their child • Urban outpatient emergency care center	• An RCT of 246 adults randomly assigned into three groups: (a) pamphlet group (n = 79), video group (n = 83), or control group (n = 84) • Educational intervention arms received identical information from the AAP on appropriate antibiotic use in children • Knowledge was assessed at three time intervals: (a) pre-intervention, (b) post intervention, and (c) four weeks post intervention	• Significant improvements were revealed in both video and pamphlet education groups at both follow-up assessments as compared to baseline scores (p < 0.001) • Knowledge scores were also improved for the video group over the pamphlet group, but not significantly (p = 0.04) • Video intervention group had significantly increased knowledge scores compared to controls at all three time intervals (p < 0.001)

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Thompson et al. (2013) *SpringerPlus* Impact of an early education multimedia intervention in managing nutrition-related chemotherapy side-effects: A pilot study *Level VI*	• Adults age 18 and older • Rural out-patient cancer center	• Pilot descriptive study • Convenience sample of fourteen chemotherapy patients shown a video and provided a written handout on dietary management of chemotherapy side effects • Knowledge, perceived benefit, and self-efficacy measured pre-intervention and two weeks post intervention	• Paired *t*-tests measured changes in knowledge between pre- and post-intervention assessments • Perceived self-efficacy significantly improved post-intervention ($p = 0.004$) • Knowledge scores significantly increased at the two-week follow-up for all four knowledge questions: (a) 1.4 vs. 2.7, $p = 0.001$, (b) 1.2 vs. 2.1, $p = 0.03$, (c) 2.2 vs. 3.5, $p = 0.01$, and (d) 1.5 vs. 3.4, $p = 0.001$
Wilson et al. (2010) *Patient Education and Counseling* Media and memory: The efficacy of video and print materials for promoting patient education about asthma *Level III*	• Adults age 40 and over • Inner city outpatient primary care health center	• Quasi-experimental design • Sequential assignment into 1 of 4 groups based upon educational design format: video ($n = 76$), print ($n = 75$), video and print ($n = 69$), or control ($n = 72$) • Educational materials were identical in content across formats Knowledge and literacy assessments performed immediately and one week post-intervention	• Multivariate linear regression models • Statistically significant increase in knowledge amongst video and print intervention groups as compared to controls ($\beta = 25.2$, 95% CI [22.5, 27.9] and $\beta = 24.8$, 95% CI [21.8, 27.9] ($p < 0.001$) • Video plus print and print only intervention groups had greater improvement in knowledge scores compared to the video only group at the one-week follow-up ($\beta = 17.2$, CI 95% [12.7, 21.7]; $\beta = 15.6$, CI 95% [11.3, 20.0]; and $\beta = 10.1$, 95% CI [5.8, 14.4], respectively ($p < 0.001$)

APPENDIX B

EBP Patient Packet
The Effects of Education on Cardiovascular Disease Knowledge

Dear Patient,

My name is Lauren Ostrowski. I am a registered nurse who has returned to Valparaiso University to study to be a nurse practitioner, like some of the providers at this clinic. To fulfill a requirement of my degree, I will be conducting an evidence-based practice project at this healthcare clinic. During this project, I will be looking at the effects of video and written educational materials on patient knowledge of cardiovascular disease.

I invite you to participate in this study. But, first I need to make certain that you meet the criteria for participation. Please review the list below to identify if you (a) have any risk factors for developing cardiovascular disease or (b) already know you have cardiovascular disease. Please place an X next to **each** of the following conditions that applies to you.

___ I currently use tobacco or cigarettes
___ I have high cholesterol levels
___ I am diabetic
___ I have high blood pressure (hypertension)
___ I take medicine for high blood pressure (hypertension)
___ I am currently overweight
___ I do not exercise frequently (At least 30 minutes, 5 or more days per week)
___ I eat mostly fast food, red meats, or other microwaveable, pre-packaged meals
___ I do not eat 4 or more servings of fruit and 4 or more servings of vegetables per day
___ I consume three or more alcoholic beverages most days of the week
___ I have a family history of cardiovascular disease in a first-degree relative (mom or dad, brother or sister)
___ I have a known history of cardiovascular disease, including coronary artery disease, stroke, or heart attack

*If you have ***not*** placed an X next to any of the above statements, you are ***not*** eligible to participate in this project. You may return this packet to the front desk at this time. Thank you very much for your time and consideration.

*If you ***have*** placed an X next to any of the above statements, you **are** eligible for participation in this project. Please proceed to the next page.

Consent Form

The Effects of Education on Cardiovascular Disease Knowledge:

Project Coordinator: Lauren Ostrowski, BSN, RN, DNP student, Valparaiso University College of Nursing

Purpose: I understand that I am being asked to join an evidence-base practice project for patients of this clinic that will examine the effects of an educational program on patients' knowledge of cardiovascular disease.

Procedure: If I join this project, I will view the educational video and handouts provided by the project coordinator. I will complete a 10-item questionnaire before the educational video and will complete another 10-item questionnaire after the healthcare appointment, before leaving the clinic. The time used to view these materials and complete the questionnaire (approximately 5-10 minutes) will take place during the normal waiting time in the examination room prior to and shortly after the visit with my health care provider.

Risks: I understand that there are no anticipated risks to participating in this project.

Benefits: I understand that I will be engaging in an educational session on cardiovascular disease, potentially increasing my knowledge on this subject manner. I realize that I may gain understanding, confidence, and desire to share this information with others or make lifestyle changes of my own, potentially resulting in better health outcomes. Information within this study can help me, but the findings from the group of participants from this clinic may also be useful for increasing knowledge for other nurses and future patients at this clinic, or elsewhere.

Voluntary Participation/Withdrawal: I understand that joining this project is totally voluntary. I am aware that I may choose to discontinue participating in the project at any time. There is no penalty for not completing the questionnaires. If I choose to stop completing the questionnaires, it will have no effect on the health care provided to me today, or at any other time, at this clinic.

Confidentiality/Anonymity: I understand that the project information will be anonymous. Information provided will be kept locked in a drawer, and only the project coordinator will have access to it. No personal identifying information will be collected. General information gained from this project may be used in nursing journals or presentations, but no one will be able to identify me from this information.

Questions: If I need to, I can e-mail Lauren Ostrowski at Lauren.Ostrowski@valpo.edu. If I have questions about the way the evidence-based practice project is being done, I can contact Julie Brandy, Chair of the Institutional Review Board at Valparaiso University. She can be reached at Julie.Brandy@valpo.edu or at (219) 464-5481.

Consent to Participate: I acknowledge that I am a patient seeking health care at this facility who is 18 years of age or older. The project has been explained to me. My questions have been answered. I have read and understand this consent form. By completing and submitting the following forms, I agree to participate in the project.

Please continue on to the next page

Project Demographic Form

Please take a few moments to answer the following questions about yourself. Please circle the letter next to your response to the following questions.

1. Are you male or female?
a. Male
b. Female

2. What is the highest level of education you have completed?
a. Less than high school
b. High school/GED
c. Some college
d. 2-year college degree (Associates)
e. 4-year college degree (BA, BS)
f. Master's degree
g. Doctoral degree

3. What is your age?
a. 25 and under
b. 26-30
c. 31-35
d. 36-40
e. 41-45
f. 46-50
g. 51-55
h. 56-60
i. 61-65
j. 66 and older

4. What is your race?
a. White
b. African American
c. Hispanic
d. Asian-Pacific Islander
e. Native American
f. Other

5. What form of health insurance do you currently have?
a. No insurance
b. Medicare
c. Medicaid
d. Private insurance

The purpose of today's health visit is:
a. Annual health visit
b. Medication refill
c. Lab results/Follow-up
d. Non-urgent care sick visit
e. Urgent care visit

Please continue on to the next page*

Project Pre-Education Heart Disease Questionnaire

Please to respond to the True/False questions regarding heart disease below. Answer each question by circling ‘true’ or ‘false’. If you are unsure of any answer, please feel free to circle ‘don’t know’.

1. Heart disease is the leading cause of death in the United States.	True	False	Don’t know
2. The healthiest exercise for the heart involves rapid breathing for a sustained period of time.	True	False	Don’t know
3. People who have diabetes are at higher risk of getting heart disease.	True	False	Don’t know
4. Heart disease is better defined as a short-term illness than a chronic, long-term illness.	True	False	Don’t know
5. Feeling weak, lightheaded, or faint is a common symptom of having a heart attack.	True	False	Don’t know
6. HDL refers to “good” cholesterol, and LDL refers to “bad” cholesterol.	True	False	Don’t know
7. Dietary fiber lowers blood cholesterol.	True	False	Don’t know
8. Most people can tell whether or not they have high blood pressure.	True	False	Don’t know
9. Eating a lot of red meat increases heart disease risk.	True	False	Don’t know
10. Men and women experience many of the same symptoms of a heart attack.	True	False	Don’t know

Note. Questions adapted from “Heart Disease Knowledge Questionnaire”, by H. E. Bergman, B. B. Reeve, R. P. Moser, S. Scholl, and W. M. Klein, 2011, *American Journal of Health Education*, *42,* p. 83.

****You have now completed the pre-education question portion of this project. Please provide this completed packet to your nurse when you are brought back to the exam room.**

Project Post-Education Heart Disease Questionnaire

Please to respond to the True/False questions regarding heart disease below. Once again, answer each question by circling 'true' or 'false'. If you are unsure of any answer, please feel free to circle 'don't know'.

1. HDL refers to "good" cholesterol, and LDL refers to "bad" cholesterol.	True	False	Don't know
2. Men and women experience many of the same symptoms of a heart attack.	True	False	Don't know
3. People who have diabetes are at higher risk of getting heart disease.	True	False	Don't know
4. Dietary fiber lowers blood cholesterol.	True	False	Don't know
5. Feeling weak, lightheaded, or faint is a common symptom of having a heart attack.	True	False	Don't know
6. Heart disease is the leading cause of death in the United States.	True	False	Don't know
7. Heart disease is better defined as a short-term illness than a chronic, long-term illness.	True	False	Don't know
8. Eating a lot of red meat increases heart disease risk.	True	False	Don't know
9. Most people can tell whether or not they have high blood pressure.	True	False	Don't know
10. The healthiest exercise for the heart involves rapid breathing for a sustained period of time.	True	False	Don't know

Note. Questions adapted from "Heart Disease Knowledge Questionnaire", by H. E. Bergman, B. B. Reeve, R. P. Moser, S. Scholl, and W. M. Klein, 2011, *American Journal of Health Education*, *42,* p. 83.

Please continue on the next page

Project Post-Education Survey

For the following questions, please circle the response that matches the extent to which you agree or disagree with the following statements.

1. After receiving these educational materials on heart disease today I talked with my health care provider about this issue.			
Strongly agree	Agree	Disagree	Strongly disagree

2. The video on heart disease was helpful in understanding my risk factors for this disease.			
Strongly agree	Agree	Disagree	Strongly disagree

3. I will share the information received today about heart disease with others.			
Strongly agree	Agree	Disagree	Strongly disagree

4. Before today I did not know what the risk factors for developing heart disease were.			
Strongly agree	Agree	Disagree	Strongly disagree

5. Because of this educational material received today, I plan to make changes in my lifestyle in order to reduce my risk for developing heart disease.			
Strongly agree	Agree	Disagree	Strongly disagree

Congratulations! You have successfully completed all the questions for this project!
Thank you for your participation!
Please leave this packet here in the examination room. But, do not forget to take your educational handout home with you.